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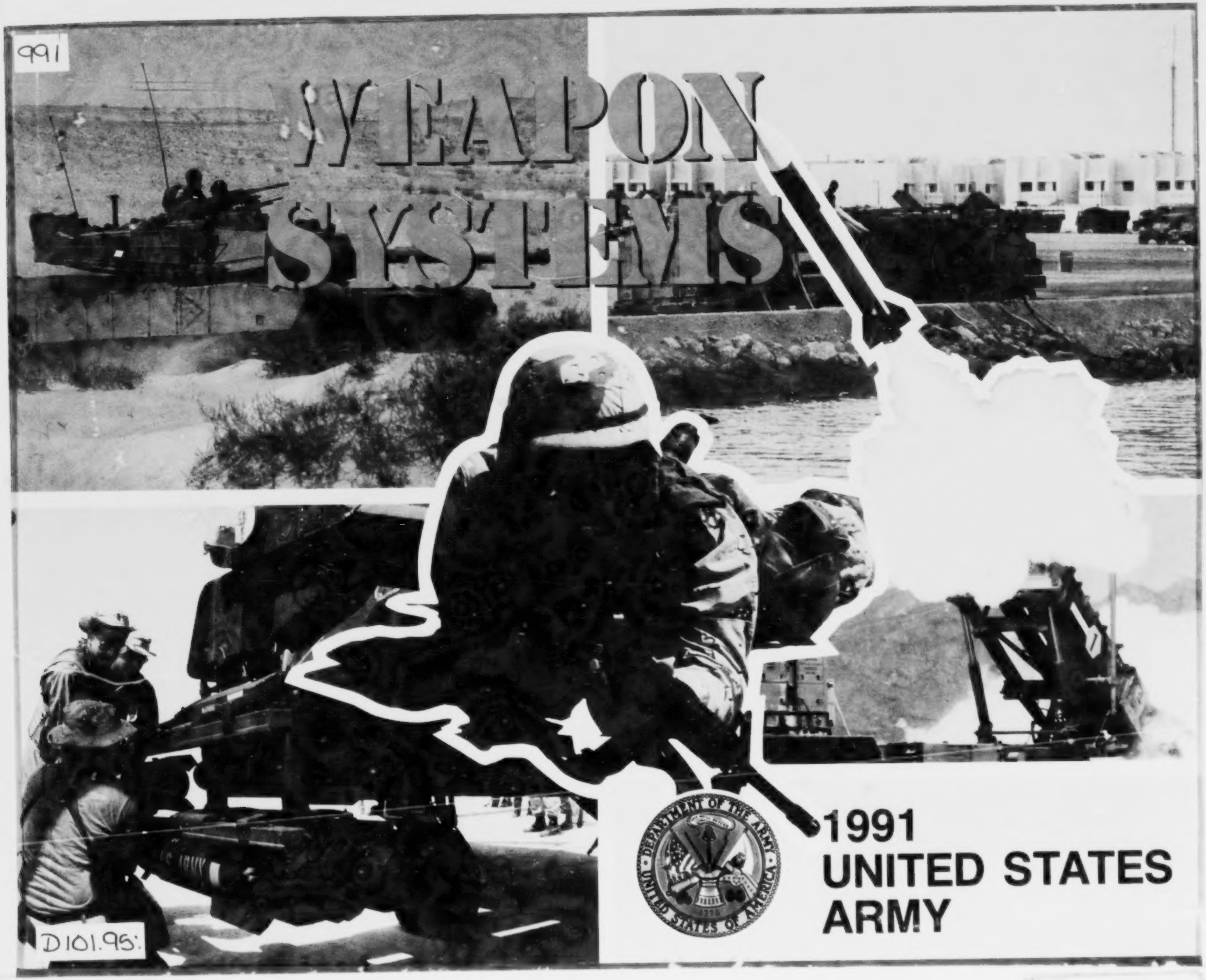
WEAPON SYSTEMS



1991
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ARMY

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DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310

March 1, 1991

To The Reader:

We, in the Army research, development and acquisition community, take very seriously our mission to provide our soldiers with the finest and most modern equipment in the world to ensure lethality and survivability on the battlefield. It is a tremendous undertaking that involves the dedicated efforts of tens of thousands of military, civilian and defense industry workers.

This handbook is intended to acquaint you with many of the Army weapon systems and our other support equipment. Keep in mind that these programs are in various stages of development. For example, the success of the PATRIOT air defense missile system in Operation DESERT STORM has made it a household name, but it has been an Army program for 25 years. It began, as with most of our fielded systems, in the technology base, which is discussed in the first section of this handbook. The Army technology base is vitally important to our present and future warfighting capability because it translates basic research into technologies of the future to ensure that we will have "PATRIOT like systems" to meet tomorrow's threat.

The sections that follow categorize the Army weapons systems and other equipment according to their specific missions. These sections include Close Combat; Air Defense; Fire Support; Combat Support; Combat Service Support; Command, Control, and Communications; Soldier Support; and Strategic Conflict.

We hope that you will find this information useful. Today, the Army has the finest soldiers in the world and combined with the superb equipment that is being developed and fielded, we clearly have superior warfighting capability on the battlefield. We are working diligently to maintain that decisive edge for the battlefield of tomorrow.

August M. Cianciolo
Lieutenant General, GS
Military Deputy to ASA(RDA)

Stephen K. Conver
Assistant Secretary of the Army
(Research, Development and Acquisition)

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TECHNOLOGY BASE

TECHNOLOGY BASE

The weapon systems of today derive many of their capabilities from the technology base portion of the Army's research and development program. Investment in defense technology has been vital to the national strategy of maintaining technologically superior forces as an offset to a numerically superior threat. Indeed, much of the superior warfighting capability of the Army today results from technology that was developed over the last three decades. The current Army technology base program is an investment in the future. If the Army is to realize its vision as a globally deployable, strategic force, essential for national security operations in peace and war, the Army technology base must be maintained as robust, innovative, efficient, and focused on the Army's most critical future warfighting needs. The Army's technology base strategy to meet these needs is embodied in the Army Technology Base Master Plan.

- OUR BRIDGE TO THE FUTURE ARMY -

TECHNOLOGY TO DETER, DEFEAT AND AVOID TECHNOLOGICAL SURPRISE

KEY EMERGING TECHNOLOGIES FOR TECHNOLOGY SUPERIORITY

TECH DEMO'S AND ATTD'S TO REDUCE RISK AND SPEED TRANSITION

MODERNIZATION AND SYSTEM UPGRADES FOR A MORE *DEPLOYABLE, VERSATILE, LETHAL, AND SURVIVABLE* FUTURE ARMY

ARMY TECHNOLOGY BASE MASTER PLAN IS THE ROAD MAP

ARMY TECHNOLOGY BASE MASTER PLAN (ATBMP)

The second edition of the Army Technology Base Master Plan (ATBMP) was published in November 1990, to accompany the FY92/93 President's Budget. Unlike the first edition of Spring 1989, this edition reflects the changing realities of the emerging global threat evidenced by Operation DESERT STORM, the evolving Defense Technology Strategy and the Defense Critical Technologies Plan. The ATBMP provides a detailed layout of Army technology base programs covering a 15 year horizon. It is the Army's strategic plan for the technology base, built on the Army's leadership's vision of the future Army as constrained by realistic funding limits. The plan balances the need for long term investment on research and key emerging technologies with a need to demonstrate the potential of more mature technologies. The technology base program includes research (6.1), exploratory development (6.2) and non-system specific advanced development (6.3A). An important part of this latter category includes a new initiative in Advanced Technology Transition Demonstrations (ATTDs).

ADVANCED TECHNOLOGY TRANSITION DEMONSTRATIONS (ATTDs)

Advanced TechnologyTransition Demonstrations (ATTDs) serve a critical role in the Army Technology Base Investment Strategy by accelerating the transition of high payoff technology base products into demonstration/validation, full-scale development and/or production improvement programs. ATTDs permit exploration of technical options and the elimination of unpromising approaches in the early stages of a program to ensure a higher probability of success in the transition process. ATTDs also allow both the user and materiel developer to work together to experiment with and refine operational concepts and requirements. This leads to acquisition programs that are technically and fiscally sound and the more efficient use of scarce financial resources.

The criteria for establishing an ATTD are:

- Potential for new or enhanced military operational capability or cost effectiveness
- Risk-reducing proof-of-principle demonstrations to be conducted at the system or major subsystem level in an operational environment rather than in the laboratory.
- Duration of approximately three (3) years
- Transition plan in place for known applications and/or potential applications
- Active participation by the User community
- Managed by the Materiel Developer

Each ATTD is baselined with a specific set of objectives, milestones, funding, transition plans and exit criteria in a funded Technology Development Plan (TDP). The transition plans show the path for planned or potential transition to weapon systems development and are aligned with materiel development needs identified in Army modernization plans.

ATTDs receive special management attention. Review and approval is by an ATTD Senior Advisory Group (SAG) co-chaired by the Deputy Assistant Secretary for Research and Technology, OASA(RDA), and the Assistant Deputy Chief of Staff for Operations and Plans, Force Development, HQDA. The first meeting of the SAG occurred in April 1990 and formally approved the following Army ATTDs:

Approved ATTDs	Army Modernization Plan
Advanced Air Defense Electro-Optical System	Air Defense
AirLand Battle Management	Command and Control
Common Chassis	Armor/Anti-Armor
Component Advanced Technology Testbed	Armor/Anti-Armor
Composite Hull for Combat Vehicles*	Armor/Anti-Armor*
Expendable Jammer Enhancement	Intelligence/Electronic Warfare
MultiRole Survivable Radar	Air Defense
Multisensor Target Acquisition	Intelligence/Electronic Warfare
Radar Deception and Jamming	Intelligence/Electronic Warfare
Rotorcraft Pilots Associate	Aviation
Soldier Integrated Protective Ensemble	Soldier Modernization
Standoff Minefield Detection	Engineer and Mine Warfare
Advanced Chemical/Biological Defense	Chemical and Biological Defense

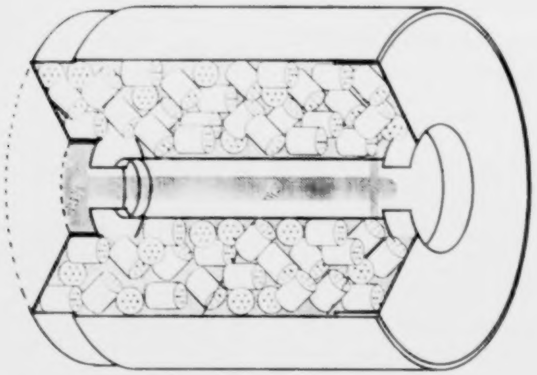
* Ends in FY 90. Not discussed in this plan.

To provide an insight into the Army ATTD program, the following descriptions of a selected set of the current ATTDs are provided.

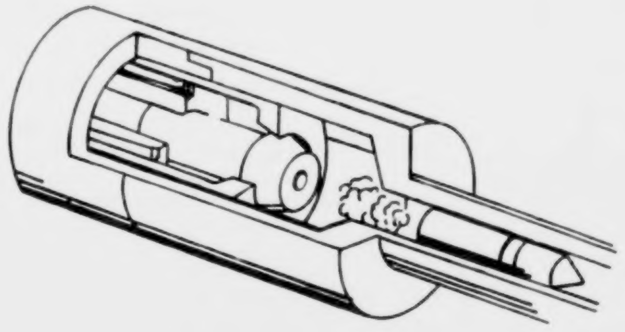
ADVANCED FIELD ARTILLERY SYSTEM (AFAS)

The 1988 Defense Science Board study on Countering Soviet Artillery recommended accelerated fielding of the Howitzer Improvement Program (HIP) and development of a next generation artillery system by 1999. The HIP can provide significant improvements in survivability and reliability over the M109 self-propelled howitzer, but shortfalls would still continue to exist in terms of survivability, range, rate of fire and manpower requirements. The AFAS program will provide all required capabilities to overmatch the threat. During FY91 the AFAS program plans to make a selection between two competing artillery gun propellent technologies, unicharge and liquid propellant. The Army is pursuing both of these new propellent technologies for the following reasons: (1) they provide the potential for increased range in excess of 40 kilometers versus about 30 kilometers for current systems; (2) they can increase the firing rate, and therefore improve artillery system lethality by placing more projectiles on target in a given amount of time; (3) they can allow crew size reductions because the new propellant can be handled and loaded by machinery instead of soldiers; (4) they can reduce the logistics burden; and (5) they can increase survivability because they are less likely to explode if impacted. The winner of the propellant competition will be demonstrated along with such advanced technologies as automatic loading and advanced fire control, in the AFAS ATTD. The AFAS will use the same chassis components as other high protection level combat vehicles under the Armored Systems Modernization program. Commonality of high density components (e.g., electronic modules, engines, track) will reduce the commander's logistics burden and facilitate maintenance and battle damage repair. Commonality will also allow the AFAS to keep pace with the maneuver force and create a true combined arms team.

Unicharge



Liquid Propellant



Standoff Minefield Detection System (STAMIDS)

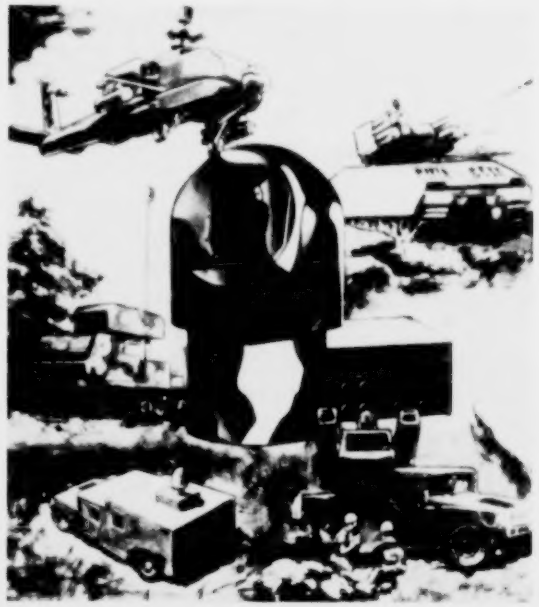
The STAMIDS ATTD will provide the Army a battlefield capability to detect mines or minefields from a standoff distance and convey this information to maneuver commanders in near real time. To meet this objective, STAMIDS will employ an airborne sensor package, an image processor package, a data link and a ground station. The sensor package will scan the ground below an aerial platform; the imaging processor will manipulate the data from the sensor to clearly detect the presence or absence of mines; the data link will transmit information from the image processor to the ground station; and the ground station will provide an ability to view the images on a video screen and allow operators to communicate via tactical radio with the supported command post. The STAMIDS ATTD is being conducted to assess the capability of different sensor technologies. The competing sensor technologies include a passive infrared (IR) line scanner, an active/passive IR line scanner, an active blue-green laser, and an IR thermal imager. The data gathered from this ATTD will be used to select the best sensor package for integration into future system development. The STAMIDS ATTD will be completed in late 1991. STAMIDS technology represents the first capability of any Army in the world to detect mines or minefields from a standoff and provide near real time reporting to maneuver units.

Advanced Air Defense Electro-Optical Sensor (AADEOS)

The AADEOS ATTD will demonstrate a ground-based infrared search and track sensor which can detect helicopters and fixed wing aircraft. AADEOS is a passive search sensor that does not emit radiation. Thus it does not advertise its presence as does an active sensor (such as radar). The proliferation of radar warning receivers on threat close air support helicopters and fixed wing aircraft provides an incentive for incorporating passive acquisition devices such as AADEOS on forward area air defense weapons. The use of antiradiation missiles which can attack our radars adds another stimulus to the development of passive target acquisition capabilities. Variations of this infrared search and track approach will be candidates for use on Line of Sight-Forward Heavy (LOS-F-H), AVENGER, as an adjunct to the Forward Area Air Defense (FAAD) ground-based sensor, and as a stand alone sensor for light and special operations forces. In the ATTD, infrared detector arrays, signal processors, cooling, optics, and clutter rejection algorithms will be addressed to assure adequate ability to track low signature helicopters buried in clutter to ranges in excess of 5 km.

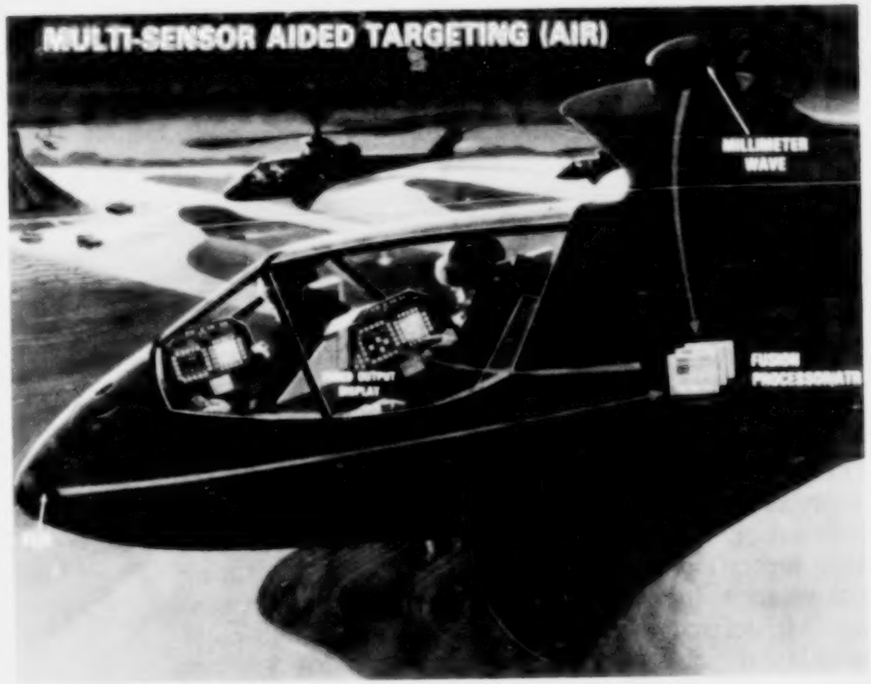
Advanced Air Defense Electro-optical System

Vision	Use of compact, low cost passive search and track sensors on short range Army air defense systems by mid to late 1990's
ATTD	Demonstration of dual band (MWIR/LWIR) IRST sensor against helicopters and aircraft with acceptable false alarm rate
Pacing Technologies	• Low cost MWIR and/or WIR multiplexed focal plane arrays • Clutter Rejection Signal Processing • Compact WFOV IR Optics



Multi-Role Survivable Radar (MRSR)

The MRSR ATTD will demonstrate a multi-function, track while scan, continuous wave radar capable of operating in the presence of antiradiation missiles and electronic counter-measures (ECM). MRSR technology will support a mobile radar capable of supporting both Forward Area Air Defense (FAAD) and Corps echelon weapons and Patriot air defense systems in contingency operations. Technology is focusing on low side lobe antenna designs, very wide bandwidth and non-cooperative target recognition techniques and the design employs Very High Speed Integrated Circuit (VHSIC) technology.



Multi-Sensor Aided Targeting-Air (MSAT-A)

The MSAT-A program will demonstrate automatic target acquisition, tracking and hand-off of ground targets in an operational environment using multi-sensor fusion techniques. The multiple sensors, consisting of a second generation FLIR and a proof of principle Longbow radar, will be integrated into a UH-60 testbed helicopter. Proven sensor fusion algorithms will be implemented in a real time processor and integrated with the sensors. MSAT-A technology will enhance the survivability and lethality of combat aviation assets as well as advanced ground combat vehicles.

In summary, ATTDs are a critical element of the Army Technology Base Investment Strategy and are a very visible part of the Army Technology Base program. ATTDs focus the efforts of the laboratories and engineering centers on infusing technology into full scale development programs and into weapon systems upgrades in a timely manner. ATTDs serve to bridge the gap between the Technology Base, and the Program Executive Officer/Program Manager communities. ATTDs serve a very valuable role in the acquisition process as they help the Army acquisition system deliver the right product at the right time with acceptable risk and at the right price to the ultimate customer, the soldier in the field.

RETURN ON TECHNOLOGY INVESTMENT

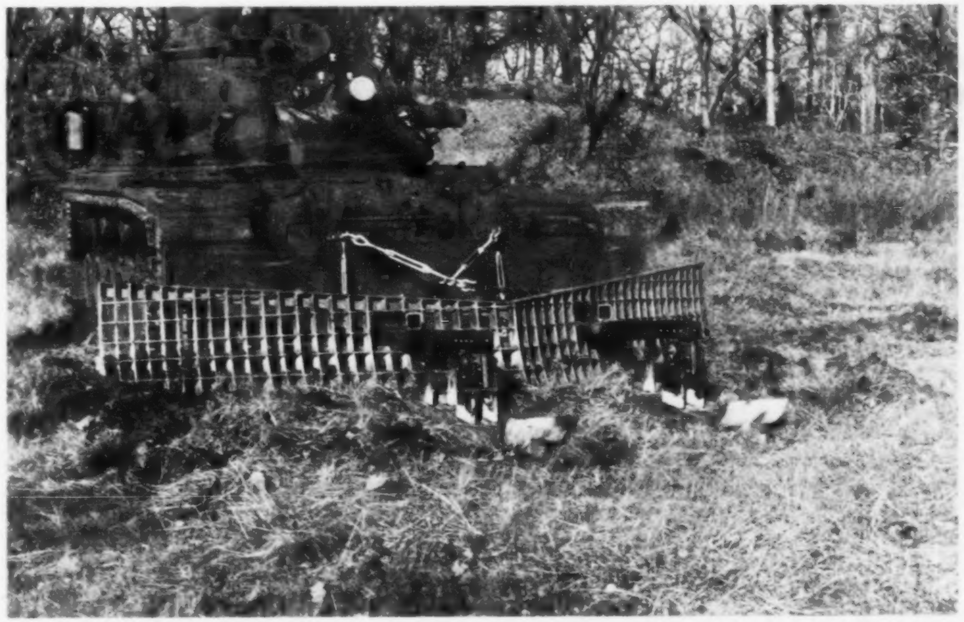
Over the last fifty years, the Army technology base has matured and brought to fielded realization a number of significant technologies as the list below highlights.

1990	Explosively Formed Projectile (EFP) sensor fused munition
	AIDS diagnostic and staging schemes published for wide usage
	Skin decontamination kit fielded
	Anticonvulsant therapy for soman nerve agent/nerve agent antidote
	Ballistic-laser protective spectacles fielded
	High precision missile thermal imaging
	Mefloquine, antimalarial drug fielded
	Advanced Composit Airframe demonstrated
	Personnel selection, classification, and assignment for formation of volunteer Army
	Wire strike protection system fielded
1980	Reverse osmosis water purification fielded
	Frequency hopping radios
	Fiberoptics applications: Fly-by-light, FOG-M, communications
	Lightweight, flexible body armor
	Meals, ready to eat (MRE)
	High burn rate solid rocket fuel technology
	First practical tilt rotor technology (XV-15)
	Composite rotor system demonstrated
	First gemeration thermal imager fielded
1940-1970	Meningitis vaccine developed
	Individual and vehicle ceramic armor
	First starlight scope fielded
	Laser rangefinders and semiactive guidance
	Photolithographic process for printed circuit boards
	First weather/communication satellite
	Redstone rocket - Army first in space
	Image intensifier scope
	BRL patented ENIAC, first digital computer
	Whole blood preservation
	Proximity fuze

The above list contains many critically important weapon system technologies that have allowed the Army to maintain its warfighting advantage. In most cases a traditional development cycle is required to transition advanced technology to the field; however, when circumstances dictate and technology permits, new concepts can be transitioned rapidly. This has been demonstrated during Operation DESERT STORM. Technology products rapidly fielded include:

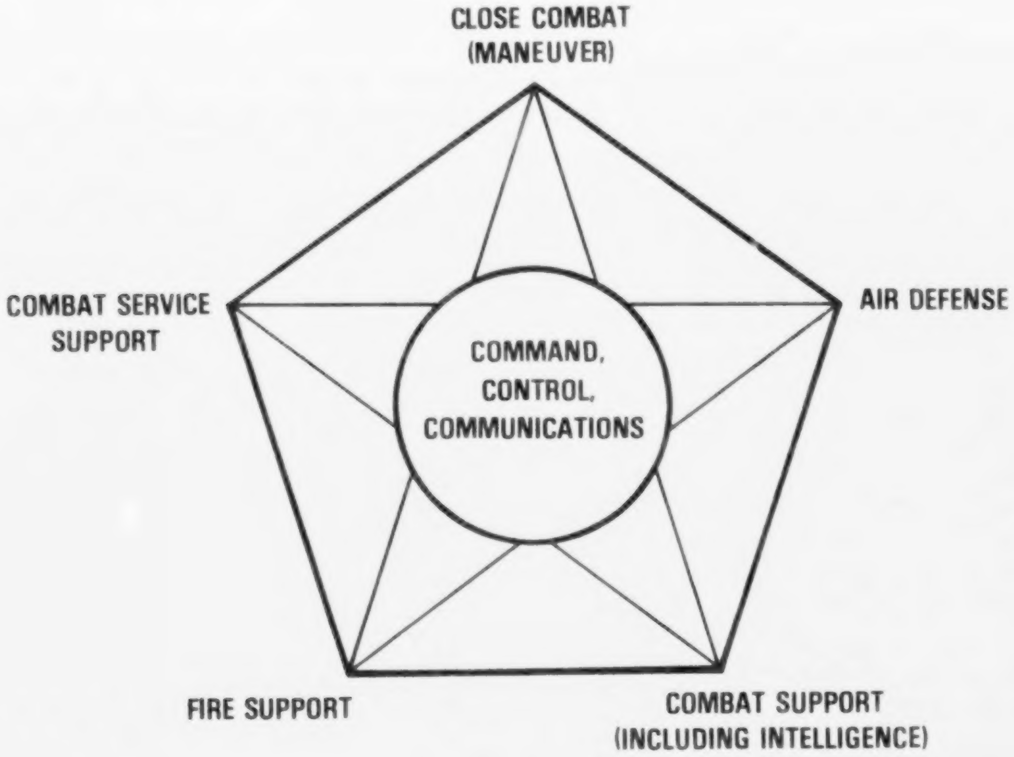
- Chemical Agent Monitors
- Skin Decontamination Kits
- Nerve Agent Antidotes
- Biological Agent Prophylaxes
- Advanced Lightweight Camouflage Netting
- Water Purification Equipment
- Ballistic/Laser Eye Protection Goggles
- Mine Rake
- Advanced Decoys

As an example of rapid transition from the technology base in response to an urgent need for Operation DESERT STORM, the Army developed and rapidly fielded a mine clearing rake to non-explosively breach a vehicle-width path through minefields in sandy environments. The rake attaches to the bulldozer blade on the Combat Engineer Vehicle without modification to the blade or vehicle. The rake teeth are spaced apart so that the sand passes the teeth but the anti-tank mines do not. Individual teeth are curved outward to facilitate lifting of the mines. The "V" shape of the attachment allows the mines to roll to either side of the vehicle thus creating a cleared path. Overall path width is fifteen feet, and total weight of the attachment is less than 4500 pounds. The rake can be installed by the crew using the on-board lifting device. Within three months of receiving the requirement, engineers in the Army Materiel Command designed, fabricated, and successfully tested a prototype unit. The use of sophisticated stress analysis codes and blast models ensured the blast survivability of the first prototype hardware. Production units were built at Letterkenny Army Depot and shipped to the Middle East in January 1991. This effort is indeed a real time return on the Army's technology base investment.



Mine Clearing Rake

The weapon systems described on the following pages are categorized by mission areas beginning with close combat. A brief explanation of the vital contribution of each mission area begins each section. It must be emphasized that these mission areas—the weapon systems and soldiers who operate them—work inextricably together on the battlefield. That is the essence of the combined arms concept and the belief that a small quality Army, working in a fully synchronized manner, will be able to hold its own against one with superior numbers. For this reason, our Research, Development and Acquisition planning is linked early and continuously with doctrine, training and force structure requirements to permit a coordinated advance across all these mission areas. In short, we strive for a balanced Army. There must be no weak links in the equipment we provide our soldiers. The logo below indicates how mission area teamwork and a balanced equipment posture is crucial to victory on the battlefield.


CLOSE COMBAT
(MANEUVER)
COMBAT SERVICE SUPPORT
AIR DEFENSE
COMMAND, CONTROL, COMMUNICATIONS
FIRE SUPPORT
COMBAT SUPPORT
(INCLUDING INTELLIGENCE)

The Close Combat mission area relates to the application of direct combat power. As the term indicates, close combat involves two adversaries standing eyeball to eyeball, with man pitted against man, weapon against weapon. This mission area includes such items as tanks, fighting vehicle systems, direct line-of-sight weapons, and short-range mortars that are used by the infantryman.

CLOSE COMBAT

Abrams Tank

MISSION:

The Abrams tank is the Army's primary combat weapon system for closing with and destroying enemy forces using mobility, firepower, and shock action. Its special armor, compartmentalization of fuel and ammunition stowage, automatic fire detection and suppression system, and high agility and mobility provide the crew with the greatest possible levels of protection on the modern battlefield--protection levels which exceed those of any other tank. The M1A1 Abrams added a 120mm smoothbore cannon and a Nuclear, Biological, Chemical (NBC) microclimatic cooling system to the already proven combination of thermal sight, laser rangefinder, and full stabilization to provide a combat vehicle capable of operating under all climate and light conditions, as well as in an active chemical environment. The 1500-horsepower turbine engine and improved suspension provide the consistently superior handling and maneuverability that allow the tank to traverse the battlefield quickly, thus decreasing its exposure to threat direct and indirect firw weapons. Crew survivability, enhanced lethality, and superior mobility combine to produce the most combat effective tank the Army has ever fielded. The Abrams Block II is in Full Scale Development today and will provide enhanced survivability, improved target acquisition and fire control equipment, and improved reliability to the Abrams tank fleet when it enters low rate production as the M1A2.

CHARACTERISTICS:

Length: 387 inches
Width: 144 inches
Height: 96 inches
Weight: 67 tons (Combat loaded)
Top Speed: 41.5 mph
Crew: 4
Main Gun: 120 mm

Secondary Armament: One .50 cal machinegun
Two 7.62 mm machineguns
Power Train: 1500hp gas turbine engine w/4 speed automatic transmission
Fire Control: Thermal Imaging Sight;
Laser Rangefinder

SOVIET COUNTERPART:

Over the past decade the Soviets have conducted an intensive armor modernization effort and have fielded several thousand T-64's and T-72's with enhanced armor protection and firepower. In addition, they are fielding the T-64B, T-80, and FST I tanks which are capable of launching Anti-Tank Guided Missiles (ATGM) through their main gun tubes.

PROGRAM STATUS:

The Abrams tank is presently in its tenth year of production. Almost 7000 tanks are in the field as of the beginning of 1991. By the end of FY92 all active component armor units will be equipped with the M1A1 or M1. Reserve Component Roundout units are also receiving the Abrams tank. Abrams Block II (M1A2) is expected to enter low rate production in 1992.

CONTRACTORS:

General Dynamics, Land Systems Div. (Sterling Hts, MI)
GMC, Allison Transmission Div. (Indianapolis, IN)
Hughes Aircraft Corp. (Culver City, CA)
Textron Lycoming (Stratford, CT)
Garrett AiResearch (Torrance, CA)

Cadillac Gage (Detroit, MI)
Honeywell Inc. (Hopkins, MN)
Kollmorgen (Norrthhampton, MA)
Singer-Kearfott (Little Falls, NJ)
Computing Devices of Canada
(Nepean, Ontario)

120mm Tank Main Gun Ammunition

MISSION:

The 120mm family of tank ammunition supports the main gun on the M1A1 tank and is fired from the smoothbore M256 cannon. The 120mm munitions are comprised of four cartridges - a kinetic energy Armor Piercing Fin Stabilized Discarding Sabot-Tracer (APFSDS-T) round, a chemical energy High Explosive Anti-tank (HEAT) round and training counterparts for each. This development program represents a successful effort to transfer the Leopard II cannon and munitions technology. The fielding of the 120mm tank weapons system complements the current fleet of 105mm tanks and provides a significant increase in the Army's armor combat capability.

CHARACTERISTICS:

M829A1 - Armor Piercing Fin Stabilized Discarding Sabot with Tracer (APFSDS-T) - Combustible cartridge case; one piece depleted uranium penetrator; discarding aluminum sabot.

M830 - High Explosive Anti-Tank with Tracer (HEAT-T) - Combustionable cartridge case; multiaction fuzing; shaped charge warhead.

M865 - Target Practice Cone Stabilized Discarding Sabot with Tracer (TPCSDS-T) - Combustible cartridge case; limited range; training counterpart for APFSDS-T.

M831 - Target Practice with Tracer (TP-T) - Combustible cartridge case; inert warhead; training counterpart for HEAT-MP-T.

SOVIET COUNTERPART:

The Soviet armor forces have available armor piercing fin stabilized, high explosive antitank, and high explosive fragmentation munitions.

PROGRAM STATUS:

Production has been scheduled to meet fielding requrements and support various testing programs. The two service rounds are being shipped in metal cans. Honeywell Inc. (Minneapolis, MN) was the sole source systems contractor for the first three years (FY84-FY86) production. General Defense Corporation (Red Lion, PA) was the winner of a second source competition with General Electric (Burlington, VT). For FY87, General Defense had approximately 20% of the production quantity; Honeywell has the balance. Since FY88, Honeywell and General Defense have competed head-to-head. During FY89, Olin Ordnance (St. Petersburg, FL) bought General Defense Corporation and assumed all GDC 120mm tank ammunition contracts. During the later part of FY90, Honeywell, Inc became Alliant Techsystems, Inc. and assumed all of HI 120mm tank ammunition contracts.

CONTRACTORS:

Alliant Techsystems, Inc. (Minnetonka, MN)
Olin Ordnance (St. Petersburg, FL)
Aerojet Ordnance (Jonesboro, TN)
Mason and Hanger (Middletown, IA)
NI Industries, Inc. (Concord, MA0
Valentec Int'l. (Costa Mesa, CA)
ARMTEC Defense Products (Coachella, CA)
Bulova Systems (Valley Stream, NY)
Hercules Inc. (Radford, VA)
Nuclear Metals, Inc. (Concord, MA)
Chamberlain Mfg. Corp. (Waterloo, IA)

Bradley Fighting Vehicles Systems (BFVS)

MISSION:

The Bradley Fighting Vehicles provide the mechanized infantry with a full-tracked, lightly armored fighting vehicles, and the scout and armored cavalry units a vehicle for their screening, reconnaissance, and security missions. Both the M2 Infantry Fighting Vehicle (IFV) and M3 Cavalry Fighting Vehicle (CFV) have a two-man turret which mounts the 25mm automatic stablized cannon, its primary armament, supported by the TOW antitank guided missile system, and the 7.62mm coaxial machine-gun. The M2 and M2A1 IFVs have, in addition, six 5.56mm firing port weapons positioned along the side and rear of the vehicle. The M2A2 IFV has only two firing port weapons positioned at the rear. The overall mobility of the vehicle is comparable to that of the M1 tank. The IFV carries a three-man crew (commander, gunner, and driver) and six infantrymen. The CFV carries a three-man crew (commander, gunner, and driver) and two scouts.

CHARACTERISTICS:

Weight: 60,000 lbs (M2/M3A2 w/o Armor Tiles)
Length: 21.5 ft
Height: 9.75 ft
Width: 10.5 ft
Main Armament: 25.mm Cannon
Secondary Armament: TOW, 7.62mm Coaxial MG, Firing Port Weapons (IFV only)

Crew: 3
Power Train: 600 hp Diesel
Cruising Range: 300 miles
Road Speed: 38 mph
Swim Speed: 4.4 mph

SOVIET COUNTERPART:

The Soviet BMP has been in the field in quantity for well over a decade and was considered the world's best fielded infantry fighting vehicles. It mounts a 73mm smoothbore cannon, an AT3, AT5, or AT6 antitank guided missile, a SAGGER antitank missile, and permits the infantry squad to fire from the inside. A variant with a 30mm gun, the BMP-2, which fires the AT4 or AT5, is also being widely fielded.

PROGRAM STATUS:

Bradley production has built up to a rate in excess of 50 vehicles per month and vehicle fielding is proceeding smoothly. To date, 47 battalion sized units, including four Army National Guard battalions, have fielded the Bradley. A major modification which incorporated the more lethal TOW 2 missile system into the vehicles was applied to the Bradley starting in 1987. These modified vehicles have been designated M2A1 and M3A1 Bradleys. A decision that incorporates increased survivability enhancements was approved during 1987. These enhancements include: spall liners in the troop compartments, enhanced applique armor, revised internal restowage of fuel and ammunition and provisions for armor tile. These modifications are being retrofitted into the M2A1 and M3A1 Bradleys currently fielded. Bradleys with the increased survivability enhancements have been designated as M2A2 and M3A2 vehicles and began production in May 1988. Competition for the add-on armor design is currently underway and a design decision is expected in May 1991.

CONTRACTOR:

FMC Corp. (San Jose, CA)
General Electric Corp. (Pittsfield, MA)
Cummins (Columbus, IN)
Colt Industries (Hartford, CT)
Hughes Aircraft Corp. (El Segundo, CA)
Ford Aerospace (Newport Beach, CA)
Honeywell (Minneapolis, MN)
General Electric Corp. (Burlington, MA)
Chrysler Corp. (Huntsville, AL)
McDonnell Douglas (Mesa, AZ)

M113A3 Armored Personnel Carrier

MISSION:

The M113A3 is a product improved, aluminum armored, full-tracked personnel carrier designed to transport troops, equipment, and cargo during combat operations. The A3 configuration adds spall suppression liners, armored external fuel tanks, an upgraded engine and transmission to accommodate the added weight, and mounting points for bolt-on armor. It operates in numerous roles including: Infantry and Engineer Squad Carrier, MED-EVAC Carrier, Maintenance Support Vehicle, and Command and Control Vehicle.

CHARACTERISTICS:

Weight:	27,200 lbs
Armament:	50 Cal. Machine gun
Armor:	Aluminum
Horsepower:	275
Road Speed:	42 mph
Troop Capacity:	13
Cross-Country:	20 mph

SOVIET COUNTERPART:

The Soviet wheeled BTR-60, BTR-70, and new BTR-80 series amphibious armored personnel carriers are roughly equivalent in function to the M113. The MTLB amphibious, multipurpose, tracked carrier is used to carry infantry and as a prime mover for towed artillery and antitank guns.

PROGRAM STATUS:

Deliveries of the new production M113A3s began in FY86, and are scheduled for completion in FY91. Depot conversion programs are ongoing in CONUS and OCONUS to modify fielded M113A2s to M113A3 configuration.

CONTRACTORS:

FMC Corp (San Jose, CA)
GMC, Detroit Diesel Allison (Detroit, MI)
GMC, Detroit Diesel Allison (Indianapolis, IN)

AH-64A Apache

MISSION:

The Apache is the Army's primary attack helicopter. It is a quick-reacting, airborne antitank weapon. Terrain limitations and the unknown placement of numerically superior enemy armor dictate the need for a system that can deploy quickly to the heaviest enemy penetration and destroy, disrupt, or delay the attack long enough for friendly ground maneuver units to reach the scene. The Apache is designed to fight and survive at day, night, and in adverse weather throughout the world. It is equipped with a Target Acquisition Designation Sight and Pilot Night Vision Sensor (TADS/PNVS) which permit its two-man crew to navigate and attack in darkness and in adverse weather conditions. Although the principal mission of the Apache is the destruction of enemy armor with the Hellfire missile, it is also capable of employing a 30mm M230 chain gun and Hydra 70 (2.75 inch) rockets that are lethal against a wide variety of targets. The Apache has a full range of aircraft survivability equipment and the ability to withstand hits from rounds up to 23mm caliber in critical areas.

CHARACTERISTICS:

Mission Gross Weight:	14,445 lbs
Cruise Speed:	145 knots
Crew:	2
Armament:	Hellfire Missiles, Hydra 70 rockets and 30mm M230 chain gun

SOVIET COUNTERPART:

The Soviets have deployed significant numbers of HIND attack helicopters. This helicopter is capable of delivering antitank guided missiles, anti-aircraft missiles, unguided rockets, Gatling gun fire, (cannon fire on some) and bombs. While the HIND is faster than the Apache, it is considered less maneuverable, probably more vulnerable, and less capable of accurate antiarmor fire in darkness and adverse weather. The Soviets are also well on the way in the development of their own version of the Apache, the MI-28 Havoc. There are three known prototypes. This helicopter looks very much like the Apache and is expected to operate in similar fashion. It is expected to be armored; armed with a cannon and to be able to carry various bombs, rockets, and some version of an air-to-air missile. Its primary role will be ground attack with a secondary role of air-to-air. It is expected to reach Initial Operational Capability (IOC) in the near future. The Soviets are also developing the HOKUM attack helicopter which is assessed to be highly maneuverable with a primary role of air-to-air against other helicopters and slow moving fixed-wing aircraft. The West has no counterpat to this helicopter. Its IOC is also expected in the near future.

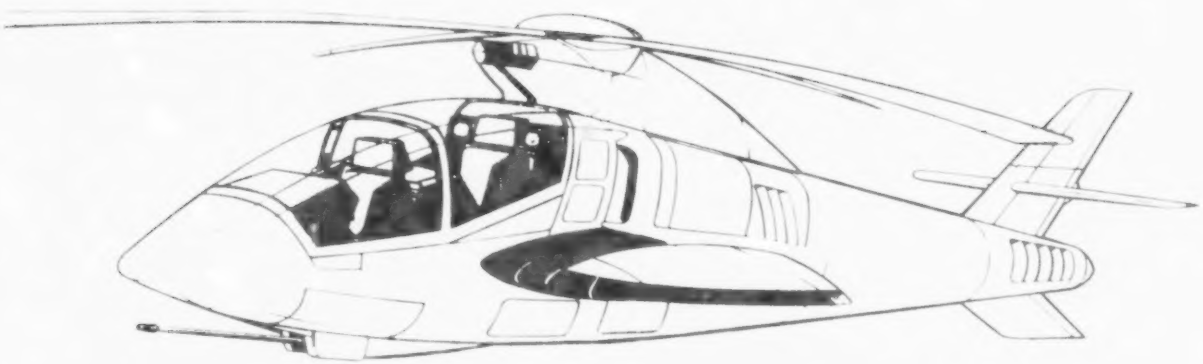
PROGRAM STATUS:

Quantity production initiated in FY92 and the Apache began to be deployed in FY86. There have been 629 Apaches delivered to the Army as of November 1990 with deliveries to continue through December 1994. Nineteen Attack Battalions are deployed and ready for combat. The current total program procurement will be 807 Apaches to support a force structure of 40 battalions (26 Active; 2 Reserve; 12 National Guard).

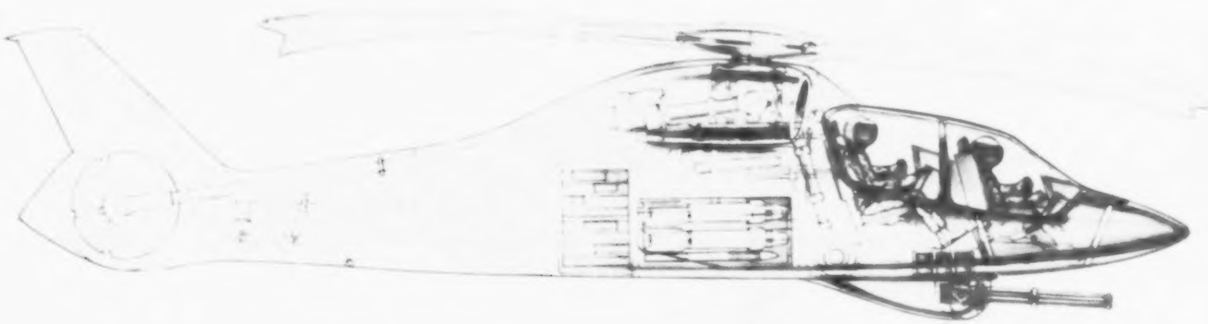
CONTRACTORS:

McDonnell Douglas Helicopters (Mesa, AZ)
General Electric (W. Lynn, MA)
Martin Marietta (Orlando, FL)

LH



SUPERTEAM (McDONNELL/BELL)



FIRST TEAM (BOEING/SIKORSKY)

LH (Light Helicopter)

MISSION:

The Light Helicopter (LH) is the Army's next generation rotorcraft which will replace the aging unarmed scouts and AH-1 attack helicopters. This aircraft in the Army's air cavalry and attack organizations will significantly expand the Army's capability to conduct tactical operations in all types of terrain, adverse weather and battlefield environments, during day/night operations with incrased survivability. The LH with its increased speed, survivability, air-to-air capability and mission equipment will enhance the combat operation so supported forces. The LH supports forward deployed and contingency forces by conducting both close and deep operations with improved lethality and survivability. The force agility will be significantly improved with LH. Its 1260 NM self-deployment range and smaller size, compared to the AH-64, will improve Army aviation's rapid strategic deployment. One helicopter, the LH, will be able to perform the missions currently being performed by three types of helicopters (AH-1, OH-58 and OH-6) better with greater operational and support efficiency.

CHARACTERISTICS:

Weight:	7,500 lbs (combat empty weight)
Speed:	170 knots (cruise)
Endurance:	2.5 hours (+.5 hour reserve)
Crew:	Two pilots (single pilot operable)
Mission Equipment Package:	Air-to-ground and air-to-air missiles, provisions for additional stores and a turret mounted cannon, night vision pilotage system, helmet mounted display, electro-optical target acquisition and designation system, aided target recognition, and integrated displays.

SOVIET COUNTERPART:

Current Soviet HIND series helicopters and developmental HOKUM and HAVOC series helicopters present the air-to-air threat.

PROGRAM STATUS:

LH was approved in June 1988 for entry into a competitive Demonstration/Validation phase of development. Following source selection, the winning LH contractor team will initiate the Demonstration/Validation Prototype phase to build and test several prototype aircraft prior to Full Scale Development. The LH Full Scale Development Milestone II decision is scheduled for September 1994. LH will be fielded in December 1998. The T800 engine, currently in Full Scale Developjment, completed Preliminary Flight Rating Testing in 1989, with engine production qualification testing currently underway.

CONTRACTORS:

LH Demonstration/Validation competitive contractor teams are Boeing/Sikorsky and McDonnell Douglas/Bell. T800 contractor team for Full Scale Development is Garrett/Allison (LHTEC).

OH-58D - Kiowa Warrior

MISSION:

OH-58D KIOWA WARRIOR is the Army's first true scout helicopter. It provides a solution to the need for the combined arms team to fight and defeat the threat during day or night operations, in adverse weather and in high temperature/high altitude conditions. The aircraft system incorporates a new drive train consisting of a four-bladed rotor, 650 HP engine compatible transmission and tail rotor systems. The Mission Equipment Package incorporated in the OH-58D consists of a Mast Mounted Sight which provides day and night target acquisition sensors and laser rangefinder designator located above the rotor to maximize aircraft survivability. A highly accurate navigation system permits precise target location information which can be handed off to other aircraft or artillery elements via the airborne target handover system. The laser designator enables OH-58D to provide designation for laser guided weapons to include Hellfire and other precision munitions. The OH-58D will operate in air cavalry units. Beginning with production deliveries in FY91, aircraft will be equipped with Air-to-Air Stinger (ATAS). Using ATAS, the OH-58D can provide security against threat aircraft. An armed retrofit program begins in FY91 which will retrofit the remaining aircraft with ATAS, arm all 243 OH-58Ds Air-to-Air Ground weapons and incorporate other improvements.

CHARACTERISTICS:

Max Gross Weight:	5,400 lbs
Speed:	118 KTAS
Crew:	2

SOVIET COUNTERPART:

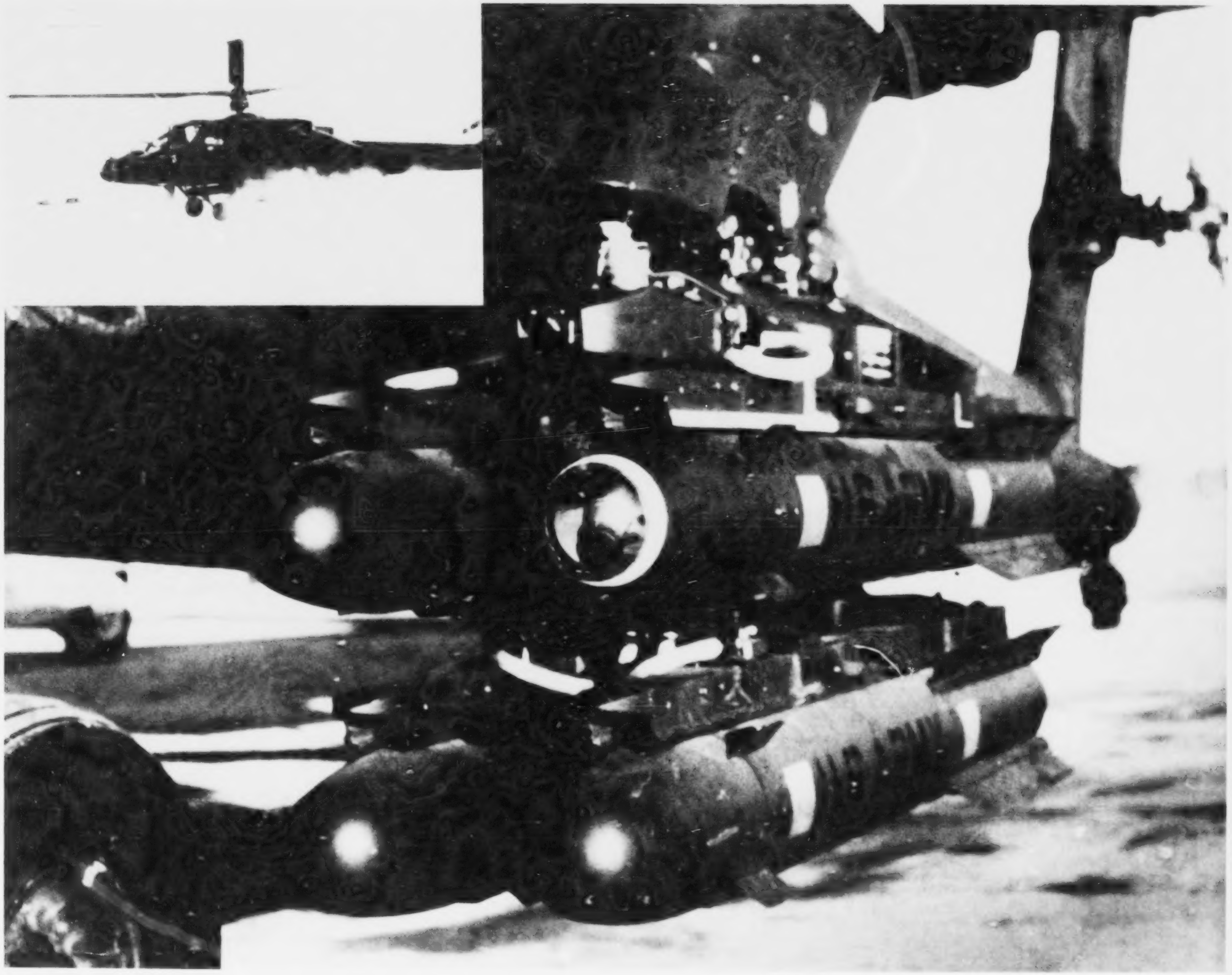
None specifically, but the Soviets have various helicopters used in an artillery spotting and reconnaissance role, such as HINDs, HIPs and Hoplites.

PROGRAM STATUS:

Kiowa Warrior is in the seventh year of production. There have been 189 aircraft accepted through December 1990. Aircraft are currently deployed to the training base at Fort Rucker and Fort Eustis and to operational units in CONUS, USAREUR, and Korea. The Procurement Objective is currently 279, with 243 for the active components and 36 for the National Guard Bureau. Deliveries will end in June 1993.

CONTRACTORS:

Bell Helicopter Textron, Inc. (Ft Worth, TX)
McDonnell Douglas Electronics Systems Co (Monrovia, CA)
Northrop Corp (Anaheim, CA)
Honeywell Inc. (Defense Avionic System Division) (Albuquerque, NM)
Litton Laser Systems (Orlando, FL)
Allison Gas Turbine Division (General Motors Co) (Indianapolis, IN)



HELLFIRE Modular Missile System

MISSION:

HELLFIRE is a third-generation airborne antiarmor weapon. It is presently employed as the main armament of the Apache helicopter. HELLFIRE homes on a laser spot that can be projected from ground observers, other aircraft and the launching aircraft itself. This enables it to be employed in a variety of modes, including autonomous, air or ground, direct or indirect, single shot, rapid or ripple fire.

CHARACTERISTICS:

Version:	Basic	Improved	HOMS	LONGBOW
Diameter:	7 in	7 in	7 in	7 in
Weight:	100 lbs	106 lbs	100 lbs	106 lbs
Length:	64 in	72 in	64 in	68 in

SOVIET COUNTERPART:

The Soviets have a wide variety of wire, radio, and laser homing antiarmor missiles of varying accuracy and lethality. No current accurate comparison is yet possible between HELLFIRE and Soviet laser homing antitank weapons.

PROGRAM STATUS:

There are four versions of the HELLFIRE missile:

oo Basic HELLFIRE - Semi-active laser seeker, approximately 35,000 produced by both Martin Marietta and Rockwell International since 1983.

oo Improved HELLFIRE - Competitive buyout to Rockwell in 1990 with options for 1991-92. Adds precursor for reactive armor.

oo HELLFIRE Optimized Missile System (HOMS) - Under development by Martin Marietta (FSD contract 1990-92), with priced production options for 1993-96. Lethal against the future threat, fully EOCM capable, restores the baseline weight and length (lost with the Improved HELLFIRE), and is cheaper to produce.

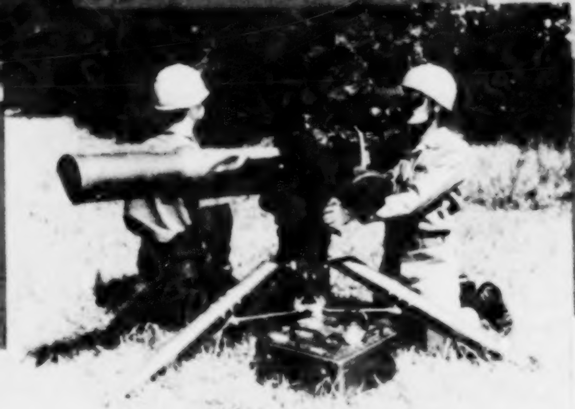
oo LONGBOW - Millimeter wave seeker variation for the HOMS missile buss. Under development by a joint venture between Martin Marietta and Westinghouse.

CONTRACTORS:

Rockwell International Corporation (Duluth, GA)
Martin Marietta (Orlando, FL)
Westinghouse

BRADLEY

COBRA



GROUND TOW

IMPROVED TOW VEHICLE

HMMWV

TOW Missile System

MISSION:

The TOW (Tube-Launched, Optically Tracked, Wire Command-Link Guided) missile is the most powerful antitank weapon used by the infantry. It is found at battalion level in ground units, mounted on the Bradley Fighting Vehicle, improved TOW Vehicle, the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and also on the AH-1S Cobra Helicopter. When the missile is fired, a sensor in the launcher tracks a beacon in the tail of the missile. The gunner need only keep his crosshairs on the target. A computer in the launcher corrects any deviation of the missile from the crosshair aim point and sends corrections to the missile via two extremely thin wires that deploy in flight.

CHARACTERISTICS:

Weight (Ground Launcher):	246 lbs
Weight (Missile-cased):	62.4 lbs
Range:	3750 meters
Crew:	3

SOVIET COUNTERPART:

The Soviets have fielded a family of semiautomatic, command-to-line-of-sight, anti-tank guided missiles similar to the TOW. The AT-4/SPIGOT is a crew served system with a maximum range of 2000 meters. AT-5/SPANDREL is the vehicular mounted version with a larger missile and a maximum range of 4000 meters. AT6/SPIRAL is the heliborne ATGM mounted on the HIND-E and has a range of 5000 meters.

PROGRAM STATUS:

Basic TOW has been in the inventory since 1970. A TOW Thermal Night Sight, an improved warhead-ITOW, and the TOW 2 missiles and modification kits to convert Basic launchers to the TOW 2 configuration have been fielded in USAREUR, EUSA, WESTCOM, FORSCOM, and SOUTHCOM. Fielding to National Guard and Army Reserve Units continues. TOW 2 Initial Operational Capability was met in October 1983 in Europe. The TOW 2A missile, developed to counter Soviet reactive armor, continues to be fielded in Europe. There is an aggressive product improvement program, which includes the TOW 2B missile, developed to further counter Soviet reactive armor was approved for production cut-in in November 1990. The TOW Sight Improvement Program (TSIP), will significantly enhance the current systems capabilities and ensure the TOW weapon system effectiveness into the 2000's.

CONTRACTOR:

Hughes Aircraft Company, Tucson, Arizona is currently the prime contractor for the TOW missile.

Advanced Antitank Weapon System-Medium (AAWS-M)

MISSION: The Advanced Antitank Weapon System-Medium (AAWS-M) is a one-man portable fire and forget weapon employed at the infantry platoon level to defeat the current and projected Soviet armor threat. The AAWS-M was developed to replace the Dragon while addressing its deficiencies. These deficiencies include lethality, range, gunner vulnerability, launch signature and time of flight. The system's long wave imaging infrared acquisition and guidance technology will be capable of operating in day, night, smoke and other battlefield obscurants, as well as in countermeasure environments.

CHARACTERISTICS:

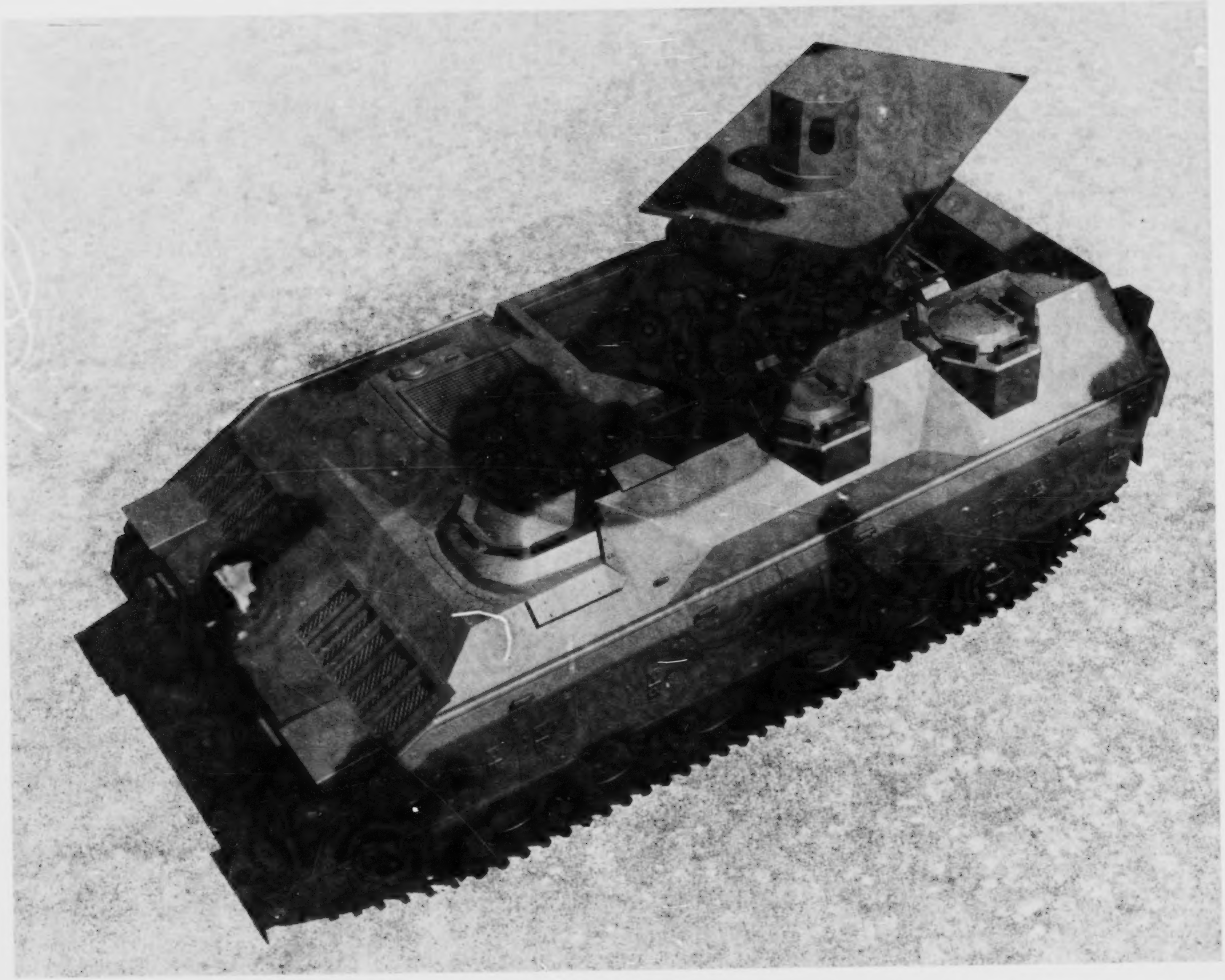
Weight:	45 lbs
Range:	2000 meters
Crew:	1
Lethality:	Capable of defeating advanced Soviet armor.

SOVIET COUNTERPART: The Soviets have fielded a shoulder fired antitank guided missile, AT-7, which is comparable to the Dragon and is their current medium, one-man portable antitank system.

PROGRAM STATUS: Firm Fixed Price (FFP) contracts for the Proof of Principle (POP) phase awarded in August 1986. The POP phase flight test program was completed 30 November 1988. The three year cost plus incentive fee contract with firm price incentive options for the first two years of low rate initial production was awarded on 21 June 1989. First Unit Equipped (FUE) is scheduled for FY94.

CONTRACTORS: Joint Venture FSD Contractors

Texas Instruments, Dallas, TX and Martin Marietta, Orlando, FL



Line of Sight Antitank (LOSAT)

MISSION:

The Line of Sight Antitank (LOSAT) program consists of a Kinetic Energy Missile (KEM) mounted on a modified (stretched) Bradley Vehicle. It is being developed as the replacement for the Improved TOW Vehicle (ITV) in the dedicated antitank companies of the Mechanized Infantry Battalions. The key attraction of the LOSAT with KEM is the tremendous overmatch lethality of the KEM (defeats all foreseeable future armor vehicles) combined with the increased mobility, survivability as well as fleet commonalty of the Bradley Vehicle; over the aging TOW weapon system and M-113 Armored Personnel Carrier. LOSAT will operate out to the maximum range of direct fire combat engagements, provide increased rate of fire and enhanced performance under day/night, adverse weather, and obscured battlefield conditions. LOSAT is completing the Proof-Of-Principle (POP) phase of development and will seek a Milestone II (MS-II) decision to enter Full Scale Engineering Development (FSED) the 3rd quarter of FY91. Under the current Acquisition Strategy, the first unit to be equipped (FUE) with the LOSAT is scheduled for fielding during the 4th quarter of FY97.

CHARACTERISTICS:

	KEM
Weight:	170 lbs
Length:	110 in
Diameter:	6.4 in
Range:	Greater than TOW
Crew:	3

PROGRAM STATUS:

The LOSAT Program is in the Proof of Principle (POP) phase and is building upon the earlier Joint Service Hyper Demo Velocity Missile (HVM) (approved in August 1988).

CONTRACTORS:

Fire Control Modularity - LTV (Prime)
FLIR-TI (Subcontractor) Dallas, TX

Lightweight Multipurpose Weapon (AT4)

MISSION:

The AT4 is the Army's Lightweight Multipurpose Weapon and supplements the M72 LAW. The AT4 is a shoulder fired recoilless weapon used against light armor and materiel targets. The system incorporates a disposable launcher and a cartridge case containing a fin stablized high explosive shaped charge projectile. The AT4's accuracy, lethality and range (over 300 meters) are considerably greater than the M72 LAW's.

CHARACTERISTICS:

Weight:	14.6 lbs
Length:	39.7 inches
Range:	300 + meters
Caliber:	84mm
Sights:	Front post/rear peep similar to M16
Storage Life:	20 years

SOVIET COUNTERPART:

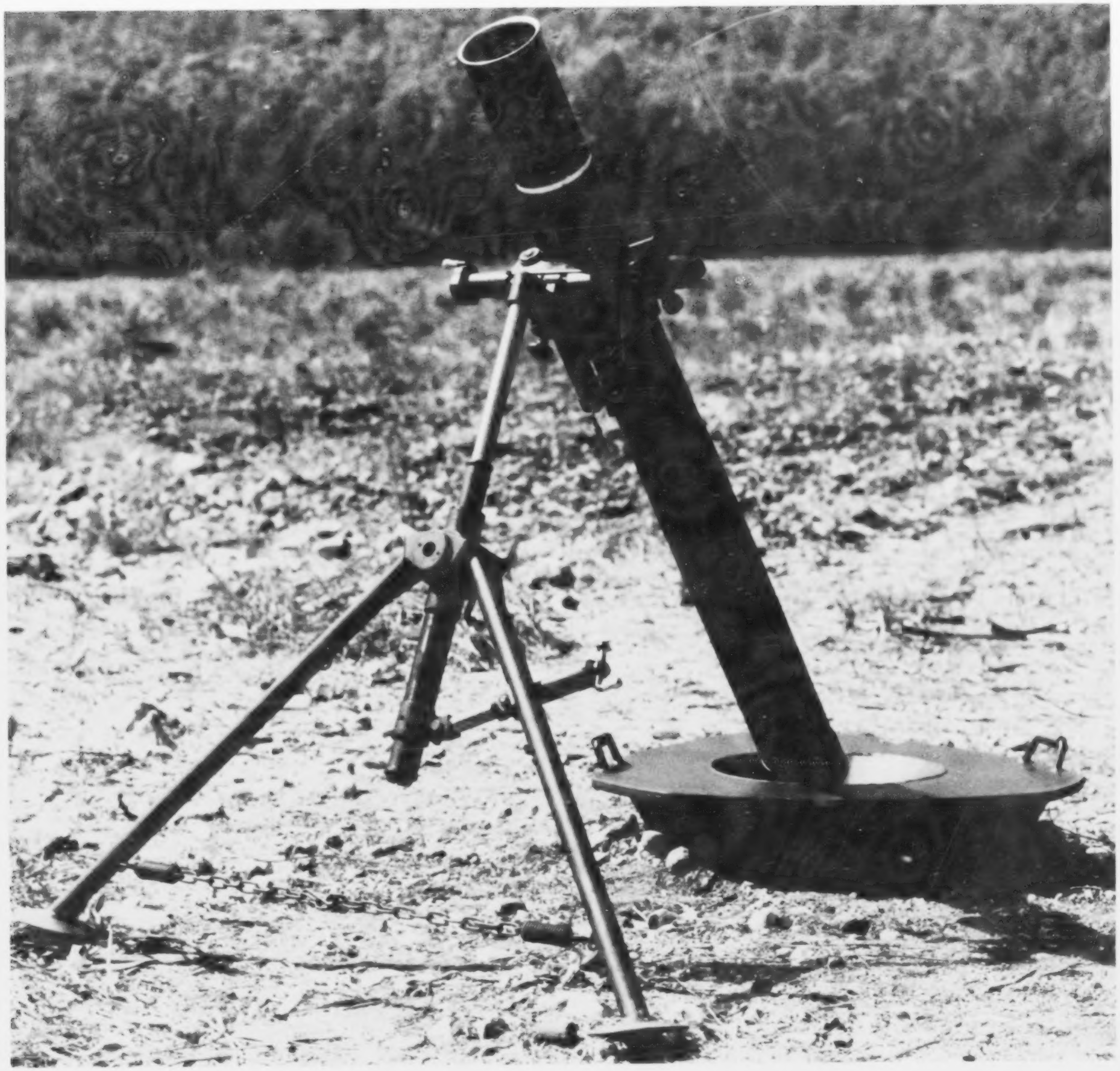
The RPG 22 probably has performance characteristics similar to the AT4 and is probably the latest fielded RPG series of weapons.

PROGRAM STATUS:

Fielding of the system is underway. Initial purchasese were procured from Sweden. The Army signed a contract with Honeywell, Inc. to produce AT4's on shore in FY88. First delivery from onshore production was in July 1989. The Marine Corps and the Navy are also buying this weapon.

CONTRACTORS:

FFV of Sweden is the worldwide producer with Alliant Techsystems, Inc. (ATI) (Minnetonka, MN) as their US licensed representative. ATI is using Joliet Army Ammunition Plant (Joliet, IL) for domestic production.



120mm Mortar

MISSION:

The 120mm mortar is a nondevelopmental system from Israel. The weapon is a conventional, smoothbore, muzzle-loaded mortar and will be employed in both towed and carrier-mounted versions. The 120mm mortar will replace the current 4.2-inch mortar and will fire a new family of enhanced ammunition currently in development. The 120mm mortar will provide an expanded range envelope as well as improved transportability, effectiveness, and standardization.

CHARACTERISTICS:

Range:	7,240 meters
Weight:	319 lbs (ground-mounted)
Rate of Fire:	4 rounds per minute, sustained
Crew:	4
Ammunition:	HE, smoke, illumination

SOVIET COUNTERPART:

The nearest Soviet counterpart is the M43 120mm mortar. Its range is 5,700 meters; it weighs 602 pounds and has a 6-man crew. It is fielded in the Soviet, Warsaw Pact, and other armies.

PROGRAM STATUS:

The weapon and a family of nondevelopmental ammunition was type classified during 1990. Initial fielding occurs during 1991. A family of enhanced ammunition, including HE, smoke, and illumination cartridges, is currently under development. All production will be in the U.S. except for initial fielding quantities (63 towed systems). FY90 procurement will purchase 85 carrier variants; FY91 procurement will purchase 196 -- all will be produced at Watervliet Arsenal, NY.

CONTRACTORS:

Martin Marietta Ordnance Systems, FL
Watervliet Arsenal, NY

Squad Automatic Weapon (M249)

MISSION:

The Squad Automatic Weapon provides a lightweight, one-man-portable machine gun capable of delivering a large volume of effective fire for infantry squads. This role was filled during World War II and Korea by the Browning Automatic Rifle, during the 1960's by the M14A1 Rifle, and during the 1970's by the M16A1 Rifle. For this role, the M16A1 was equipped with a bipod and fired in the automatic mode. There are two and three M249's in Army and Marine Corps Infantry squads, respetively. Acquisition is also programmed by the Air Force and expected of the Navy. Modifications are being made to the waepon to enhance soldier-weapon interface.

CHARACTERISTICS:

Caliber:	5.56mm
Weight:	16.3 lbs
Rate of Fire:	750 rds/min
Range:	800 meters
Magazine Capacity:	200 rds

SOVIET COUNTERPART:

The cloest Soviet equivalent systems are the 7.62mm PKM and the 5.45mm RPK 74 which are fielded with Soviet and Warsaw Pact nations.

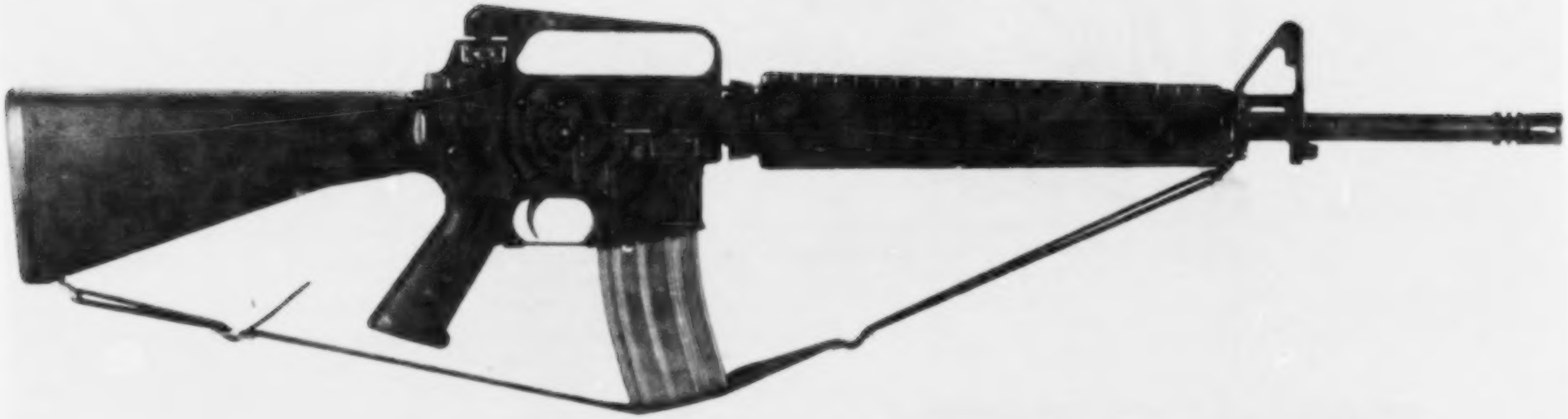
	PKM	RPK74
Caliber:	7.62mm	5.45mm
Weight:	18.5 lbs	11 lbs
Rate of Fire:	650 rds/min	600 rds/min
Range:	1000 meters	800 meters
Magazine Capacity:	100 rds	75 rds

PROGRAM STATUS:

Fielding of the M249 started in FY84. Improvements recommended by users have been successfully tested and approved. These changes have been incorporated into the current 5-year, multiyear, competitively selected, firm fixed price contract awarded in September 1988.

CONTRACTOR:

CONUS procurement began with a contract awarded to FN Manufacturing Inc. (Columbia, SC) in September 1988.



M16 A2 RIFLE

M16A2 Rifle

MISSION:

The M16A2 is an improved version of the M16A1 and is being issued to front line combat soldiers as the Army's primary combat rifle. The M16A2 is a lightweight, air-cooled, gas operated, low impulse rifle. It incorporates improvements in sight, pistol grip, stock and overall combat effectiveness. Accuracy is improved by incorporating an improved muzzle compensator, three round burst control, a heavier barrel and by using the heavier NATO standard ammunition which is also fired by the Squad Automatic Weapon.

CHARACTERISTICS:

Caliber:	5.56mm
Weight:	8.9 lbs
Range:	550 meters
Type of Fire:	Semi-automatic, three round burst
Magazine capacity:	30 rounds

SOVIET COUNTERPART:

The 5.45mm AK-74 Assault Rifle is currently in service in Soviet and some Warsaw Pact forces.

Caliber:	5.45mm
Weight:	7.9 lbs
Range:	400 meters
Type of fire:	Semi-automatic, automatic
Magazine capacity:	30 rounds

PROGRAM STATUS:

The Army First Unit Equipped (FUE) occurred in January 1987 and to date, approximately 270,000 weapons have been fielded. Some M16A1 rifles will be converted to M16A2 rifles during depot overhaul using modification kits. A five-multiyear, competitively selected, firm fixed price contract was awarded in September 1988.

CONTRACTOR:

Colt Industries (Hartford, CT) began original production in June 1983. Current contractor is FN Manufacturing Inc. (Columbia, SC).

P M

M9 9mm Personal Defense Weapon

MISSION:

The 9mm pistol is the standard replacement weapon for the M1911A1 .45 caliber pistol and four-inch barrel caliber .38 revolvers currently used by the Department of Defense. The M9 is a semiautomatic double-action pistol that is more lethal, lighter, and safer than the M1911A1 pistol. It can be used effectively by either right or left handed shooters. The weapon will be issued to individuals who are not riflemen, or who are not issued rifles for personal defense, for law enforcement personnel, close quarter requirements, and aviators. The 9mm pistol is a Joint Service Program which provides a weapon capable of firing NATO standard 9mm ammunition.

CHARACTERISTICS:

Caliber:	9mm
Weight (Loaded):	2.6 lbs
Range:	50 meters
Trigger action:	Double
Magazine capacity:	15 rounds

SOVIET COUNTERPART:

The 9mm Makarov is the standard pistol for the Soviet forces and for most of the countries in the Warsaw Pact. It is a copy of the Walther PP in general size, shape and handling.

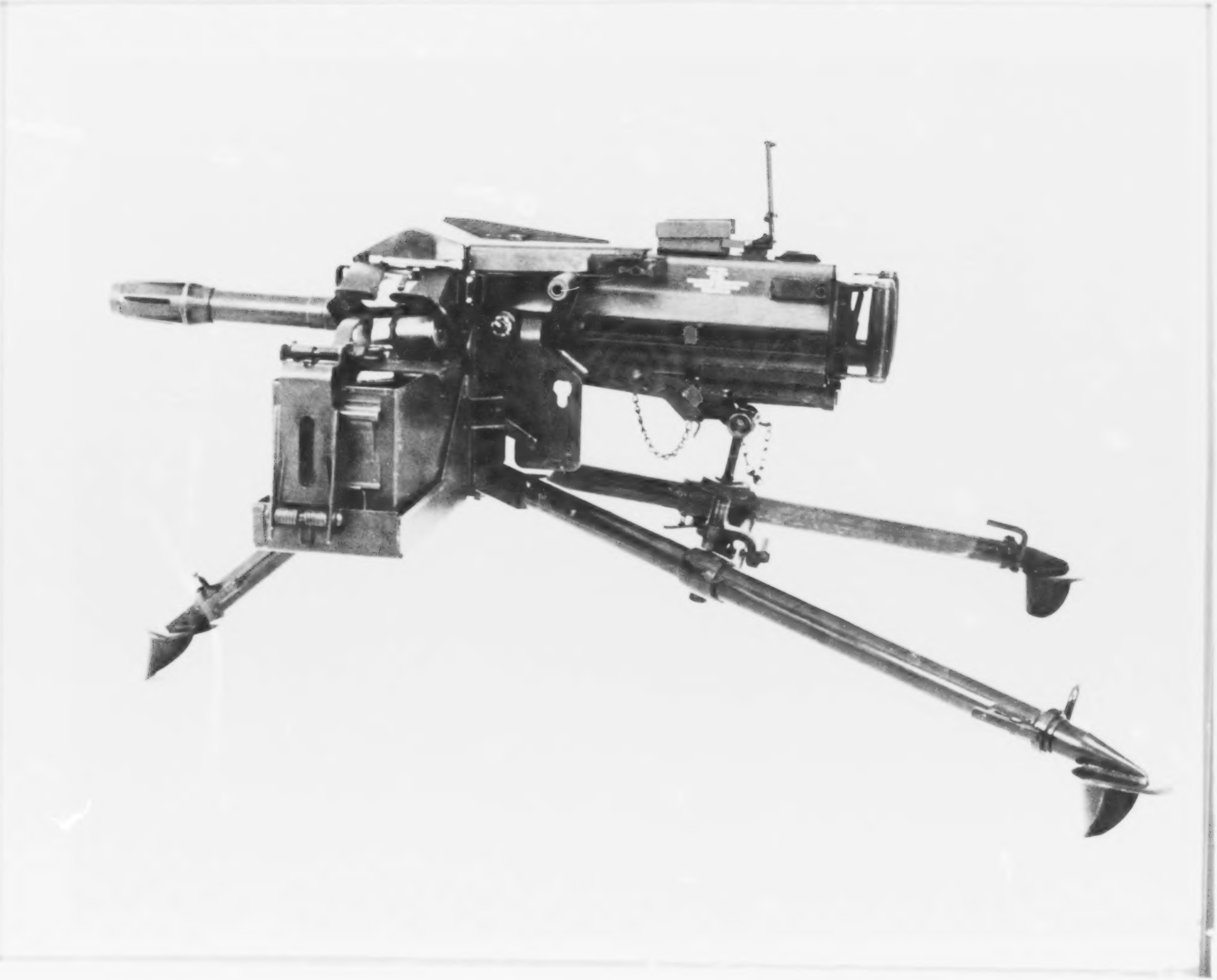
Caliber:	9mm
Weight:	1.8 lbs
Range:	50 meters
Trigger action:	Double
Magazine capacity:	8 rounds

PROGRAM STATUS:

The 9mm Personal Defense Weapon is being produced for the Joint Services. An initial five year multiyear, firm fixed price (FFP) contract was awarded in April 1985 for 315,930 weapons. A follow-on competition was conducted in FY88/89 resulting in the award of option quantitites (over 500,000) to Beretta USA commencing May 1989. As of January 1991, more than 150,000 pistols have been delivered.

CONTRACTOR:

Beretta, USA (Accokeek, MD)



MK19-3 40mm Automatic Grenade Launcher

MISSION:

The MK19-3 will be used in offensive and defensive operations against personnel and light-armored vehicles. It will be used in the main battle area primarily by light and contingency forces and by Military Police units to conduct rear area security missions. The MK19-3 will be mounted on M113 Armored Personnel Carriers, High Mobility Multi-Purpose Wheeled Vehicles (HMMWV), selected cargo trucks, and the M88A1 Medium Recovery Vehicle.

CHARACTERISTICS:

Caliber:	40 mm
Weight:	72.5 lbs
Rate of fire:	325-375 rds/min
Max effective range:	1500 meters (point targets); 2200 meters (area targets)
Lethality:	Anti-personnel--5 meters (Expected Casualty Radius) Anti-armor--2.0 inches penetration to maximum range of 2200M

SOVIET COUNTERPART:

The Soviet 30mm AGS-17 automatic grenade launcher was developed as a result of the fielding of the U.S. 40mm MK19 Mod O machine gun, which saw extensive service in Vietnam.

Caliber:	30mm
Weight:	37 lbs
Rate of fire:	100-400 rds/min
Max effective range:	1200 meters; max range is 1700 meters

PROGRAM STATUS:

The MK19-3 was developed and approved for Service use by the Navy in 1981. The Army type classified the MK19-3 as standard "A" January 1986. Initial procurement of MK19-3 for the 9th Infantry Division was contracted for by the Navy in October 1983. The Army assumed program management responsibilities from the Navy in FY88. A new competitive multiyear contract was awarded in December 1988. First Unit Equipped (FUE) occurred in November 1989.

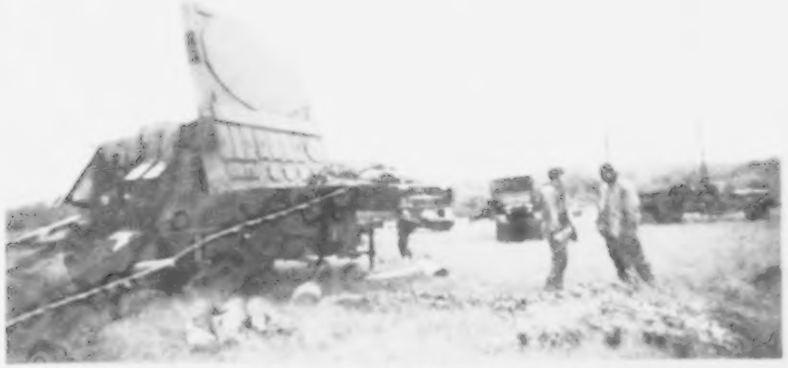
CONTRACTOR:

SACO Defense Inc. (Saco, ME)

The Air Defense mission area relates to the detection and engagement of the air threat with ground fire systems. Air defense systems must protect all ground forces elements including troop formations, depots, lines of communication, air bases, key command and control facilities, and other vital assets.

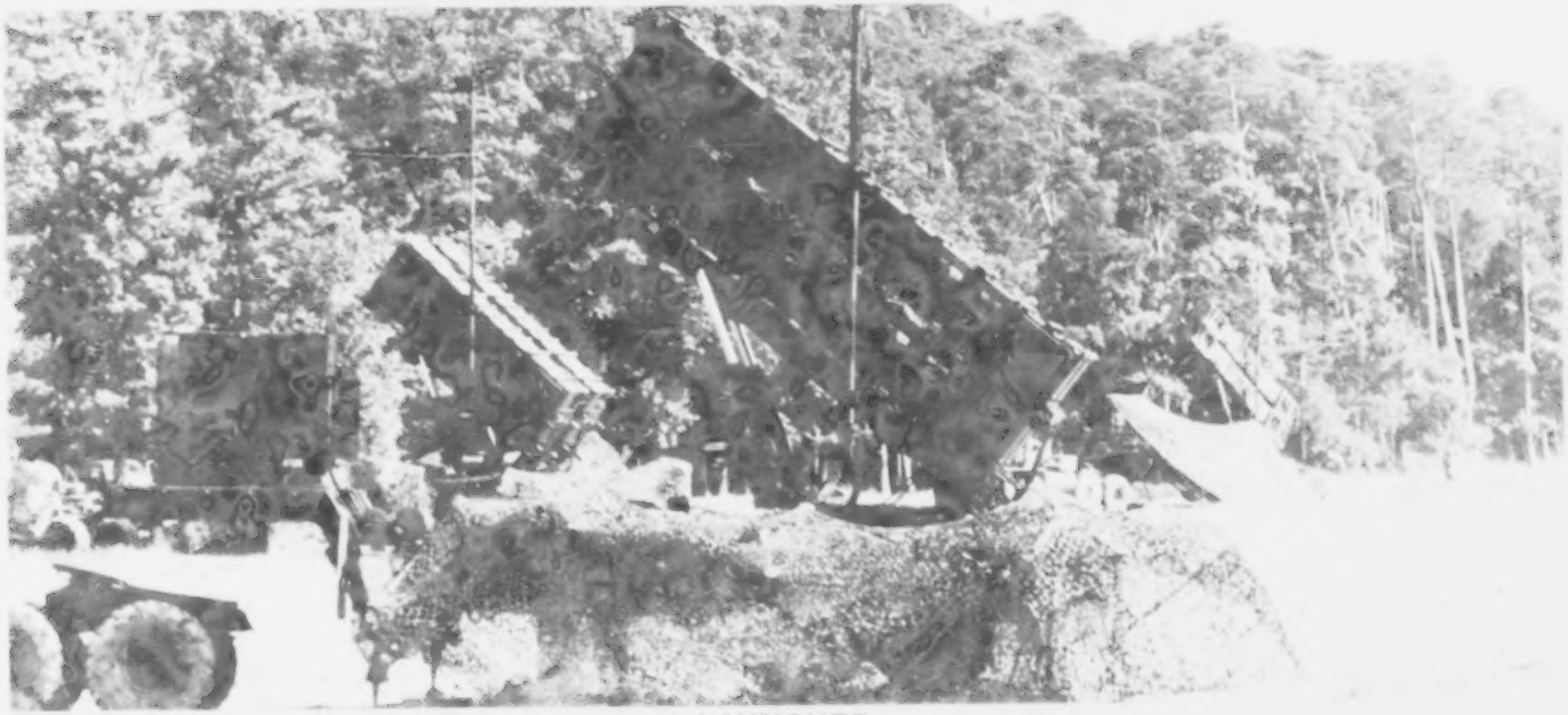
AIR DEFENSE

PATRIOT



RADAR

MISSILE



LAUNCHER

PATRIOT

MISSION:

The PATRIOT missile system is the centerpiece of theater air and tactical ballistic missile defense. The system's fast reaction capability, high firepower, and ability to operate in a severe electronic countermeasure environment are features not previously available in the systems PATRIOT replaces. The PATRIOT design eases the field logistic burden since its overall performance is achieved with less equipment, less operational manpower and fewer repair parts than previous systems. The combat element of the system is the fire unit which consists of a radar set, an engagement control station, a power plant, antenna mast group and eight remotely located launchers. The system is highly automated combining high-speed digital processing with various software routines to effectively control the battlespace. The single radar, using phased array technology, provides for all tactical functions of airspace surveillance, target detection and track, and support of missile guidance. The only manned element of the fire unit during air battle, the engagement control station, provides the human interface for control of automated operations. Each launcher contains four ready-to-fire missiles, sealed in canisters, which serve a dual purpose as shipping containers and launch tubes.

CHARACTERISTICS:

Guidance: Command/Track-Via-Missile
Engagement: Multiple Targets Simultaneously

SOVIET COUNTERPART:

The Soviets have several missile systems, including the SA-1, SA-2, SA-4, SA-5, SA-10, and SA-12, that are used to attack aircraft in the regime for which PATRIOT was designed. Only the SA-10 and SA-12 are considered as advanced or effective as PATRIOT.

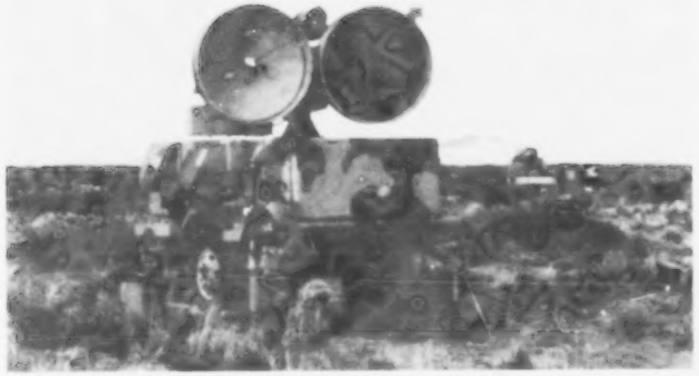
PROGRAM STATUS:

PATRIOT is in its twelfth year of production and was initially deployed to Europe in 1985. Ten half-battalions are currently operational with backfill underway. U.S. missile production deliveries include PATRIOT ATM capability-Level 2 (PAC-2) modifications. PAC-2 missiles and Post Deployment Build-3 (software) provide PATRIOT a limited asset defense against the TBM threat. Germany, The Netherlands, Italy, Saudia Arabia and Israel are currently participating in PATRIOT acquisition programs to provide for cooperative air defense improvements. The first NATO unit was delivered in 1986 and discussions continue with other interested NATO allies. Additionally, Japan has been licensed for the production of 26 fire units.

CONTRACTORS:

Ratheon Company (Bedford, MA)
Martin Marietta Corporation (Orlando, FL)

HAWK


High Power Illuminator

Continuous Wave Acquisition Radar

Launcher

HAWK

MISSION:

HAWK is a medium-range air defense guided missile system designed to provide air defense protection against low to medium altitude air attack. First fielded in 1960, it is a mobile, all weather, missile system providing vital air defense for critical installations and maneuver forces. HAWK is highly lethal, reliable and effective in the electronic countermeasures environment of the modern battlefield. HAWK units are being reorganized into a more streamlined and efficient fighting organization. Each firing platoon is comprised of a platoon command post, an acquisition radar, a tracking radar, an optical tracking system, an Identification, Friend or Foe (IFF) system, and three or four launchers each with three missiles. The HAWK missile is guided by reflected radar energy and uses a proximity fuze to detonate its highly lethal warhead. HAWK's latest product improvement (PIP III) will provide a low-altitude, simultaneous engagement capability and enhanced electronic counter-countermeasures.

SOVIET COUNTERPART:

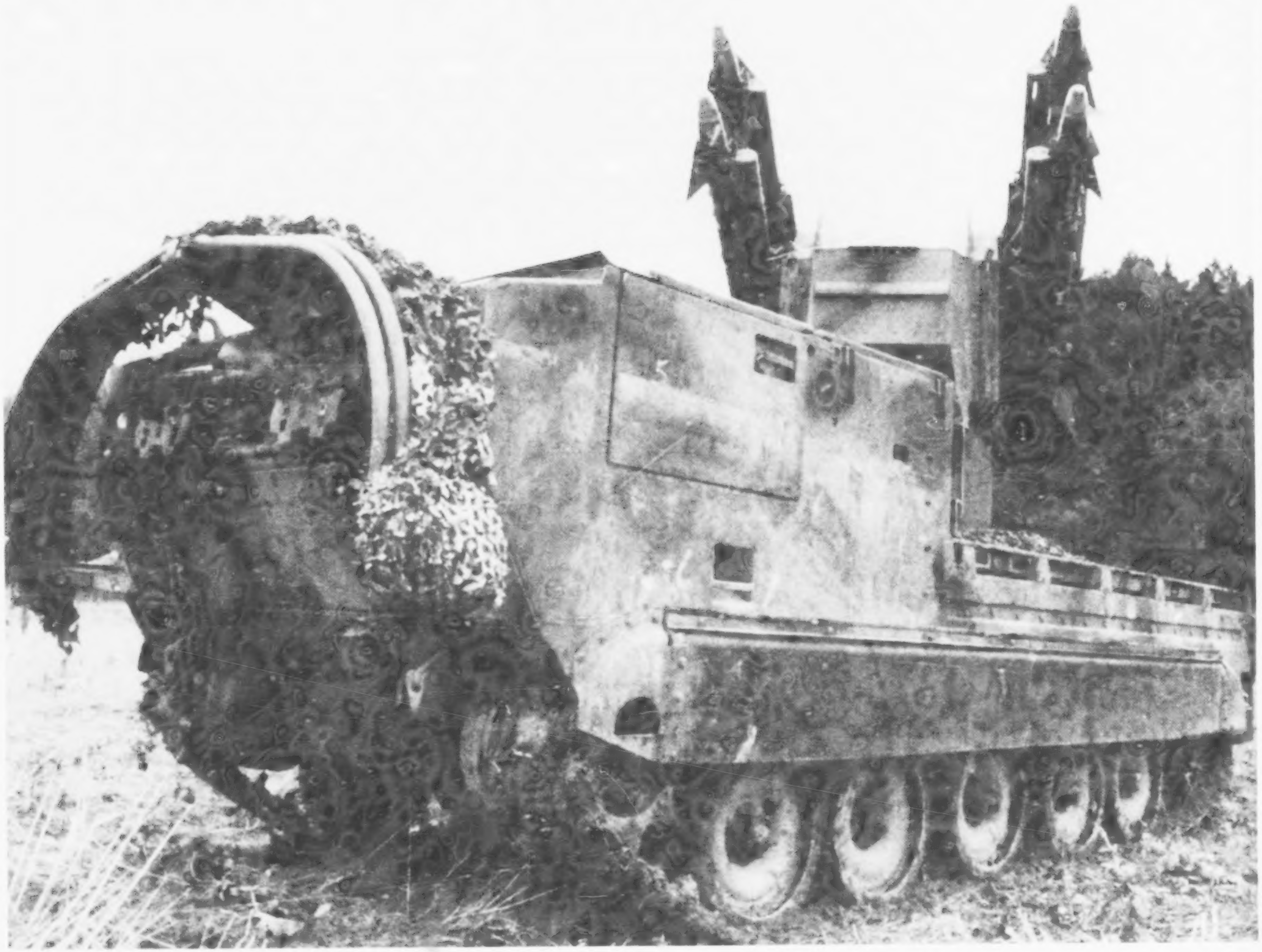
The Soviet SA-6 is somewhat similar to HAWK. Its range and altitude capabilities (30 km and 10 km, respectively) are less than that of the HAWK, but the SA-6 is more mobile. The basic SA-6 unit is a regiment which includes five missile batteries. Each missile battery contains a target acquisition and fire control radar called "STRAIGHT FLUSH" and four Transporter Erector Launchers (TEL). Each TEL carries three ready-to-fire missiles.

PROGRAM STATUS:

HAWK is deployed worldwide with the Army, Marines, NATO, and numberous other nations. HAWK modernization is continuing with the procurement of the third in a series of product improvements that will further enhance the firepower, reliability, and combat effectiveness of the system. The Army began fielding of PIP III systems in FY89. A program to enhance the system's mobility has been initiated as a cooperative development between the U.S. Army, the Netherlands, and the U.S. Marine Corps.

CONTRACTORS:

Raytheon Company (West Andover, MA)
Aerojet (Sacramento, CA)
Westinghouse Electric Corp (Baltimore, MD)
Northrop Corp (Anaheim, CA)
ICSD (Hauppauge, NY)
DBA (Kissimmee, FL)
General Electric (Huntsville, AL)



CHAPARRAL

MISSION:

CHAPARRAL is one of the Army's short-range air defense (SHORAD) surface-to-air missile systems. It is effective against all types of aircraft at low altitudes and provides protection for corps, theater rear areas and, currently, division areas. CHAPARRAL is a self-propelled system. Its tracked carrier provides excellent cross-country mobility. The launch station can be removed from the carrier and operated from a ground emplacement. It is equipped with a Forward Looking Infrared Subsystem that provides day/night and adverse weather capability and extends system acquisition range. The missile is lightweight, supersonic, fire-and-forget, with an all aspect passive infrared homing guidance system capable of engaging both approaching and receding targets. To enhance missile acquisition range and infrared countermeasure rejection capability the Rosette Scan Seeker (RSS) guidance section has been developed. To reduce rocket motor smoke, a smokeless motor has been developed and is being retrofitted to inventory missiles upon shelf-life expiration of the current "smoky" motors. To assist the gunner in identifying targets as friendly, CHAPARRAL has an Identification Friend-or-Foe (IFF) subsystem. CHAPARRAL carries four ready missiles on launch rails and eight additional missiles in storage compartments. CHAPARRAL, which was initially fielded in 1969, is continually being improved and will remain in the inventory into the 21st century.

CHARACTERISTICS:

Crew:	Four
Guidance:	Infrared Homing, Fire and Forget
Warhead:	Blast-fragmentation
Fuze:	RF directional doppler

SOVIET COUNTERPART:

The SA-9 and SA-13, introduced in late 1960's and 1970's respectively, are the counterparts to CHAPARRAL. They have approximately the same range and also use an infrared homing guidance system. The SA-9 is mounted on a two-axle amphibious vehicle; the SA-13 is on an MTLB tracked vehicle.

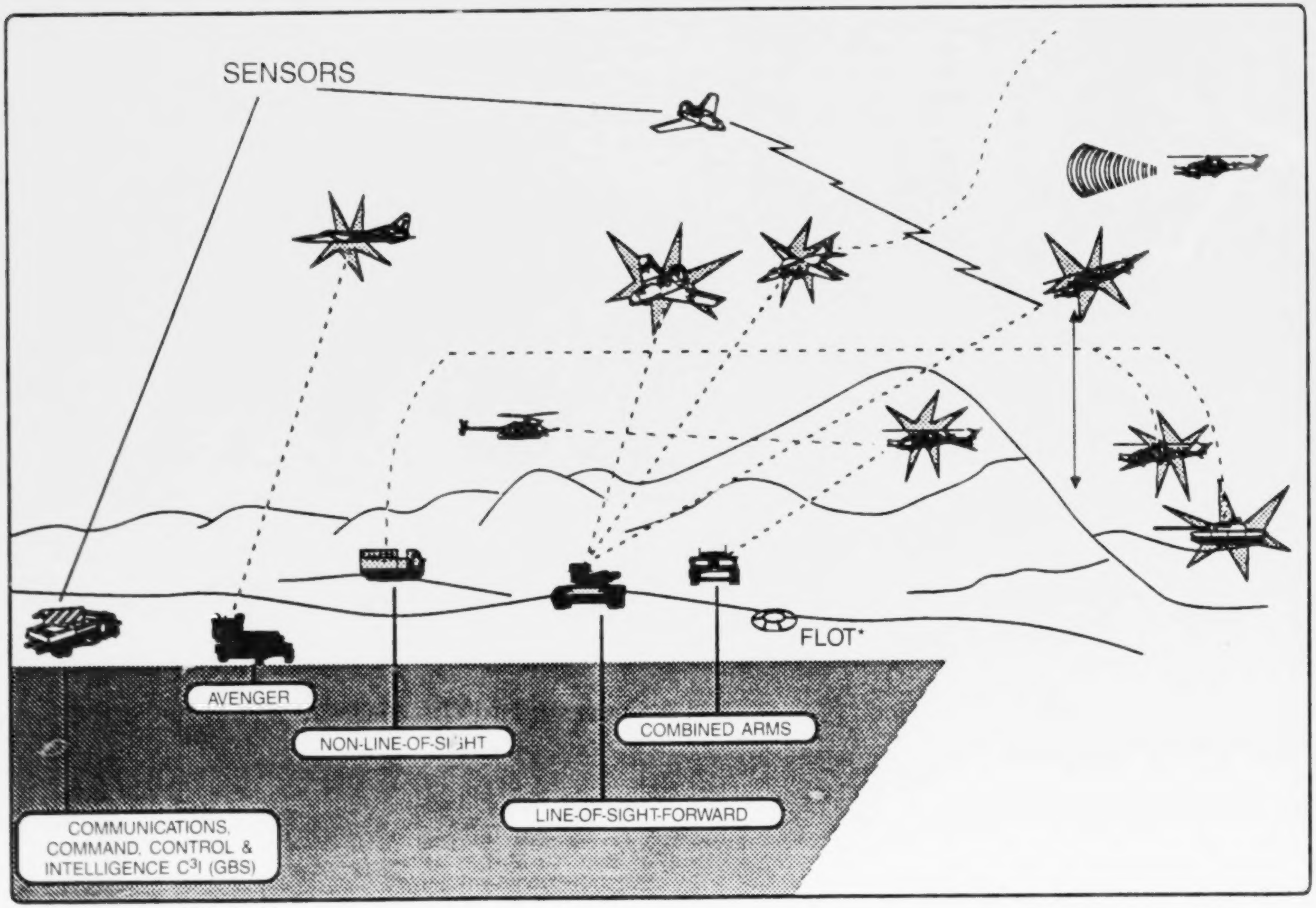
PROGRAM STATUS:

The initial contract for production of the improved Rosette Scan Guidance Section was awarded competitively to Hughes Aircraft Company in September 1988. The FY89 RSS production contract was awarded to the prime developer, Loral Aeronutronic. The FY90 RSS procurement contract was awarded to Hughes Aircraft Company.

CONTRACTOR:

Loral Aeronutronic (Newport Beach, CA) - System Development and RSS Production
Hughes Aircraft Co. (Tucson, AZ) - RSS Production

FORWARD AREA AIR DEFENSE SYSTEM (FAADS)


SENSORS
FLOT*
AVENGER
NON-LINE-OF-SIGHT
COMBINED ARMS
LINE-OF-SIGHT-FORWARD
COMMUNICATIONS, COMMAND, CONTROL & INTELLIGENCE C³I (GBS)

*FORWARD LINE OF TROOPS

Forward Area Air Defense System (FAADS)

MISSION:

The cancellation of the DIVAD program resulted in a major reassessment of air defense requirements in the Forward Area. The lessons learned from the DIVAD experience indicated that one weapon alone, or even multiple weapons acting independently, cannot defeat the air threat. FAADS is an integrated program of complementary systems which will provide Army Divisions with dedicated Air Defense Artillery (ADA) and integrate Joint and Combined Arms efforts to counter the threat. Ongoing Army programs are being combined with new technology to integrate weapons, sensors, and a command, control and intelligence architecture into a system of systems optimized to counter the entire spectrum of the air threat to the forward area through the 1990's and beyond. The FAADS concept is designed to provide total coverage in the division area and permits the enemy no preferred attack option. The strategy relies heavily on nondevelopmental items (NDI) and preplanned product improvements (P3I) to overcome our current air defense deficiencies and keep pace with the advancing threat.

CHARACTERISTICS/ PROGRAM STATUS:

FAADS consists of five components: Line of Sight-Forward-Heavy (LOS-F-H), the Air Defense Anti-Tank System (ADATS); Line of Sight-Rear (LOS-R), the AVENGER missile system; Non-Line of Sight (NLOS); FAAD Command, Control and Intelligence; and Combined Arms Initiatives. The Line of Sight-Forward-Heavy (LOS-F-H) provides freedom of maneuver to heavy forces in the main battle area of killing helicopters and airplanes prior to their releasing ordnance. Martin Marietta's ADATS was selected through competitive testing to fill the LOS-F-H role. Technical and operational tests show ADATS is effective, but has low reliability. The reliability must meet requirements prior to fielding. The Army plans to buy 378 systems with fielding in FY96. Line of Sight-Rear (LOS-R) is a missile/gun system mounted on the HMMWV. LOS-R provides a weighted, area defense against the air threat to the brigade and division rear areas. Also known as Pedestal Mounted Stinger (PMS), this system uses the proven Stinger missile and a .50-caliber machine gun. Boeing's AVENGER, selected to perform this role, provides a shoot-on-the-move, soldier friendly solution to the LOS-R requirements. The First Unit Equipped (FUE) for AVENGER was FY89 in the 3 ACR. A procurement of 1,779 fire units is planned. FAAD Command, Control, and Intelligence (FAAD C2I) integrates FAADS components into a synergistic system of systems by providing rapid and reliable (1) targeting; (2) air situation; and (3) air battle management information. FAAD C2I will assist in planning, directing, coordinating, and controlling the FAAD fight. FAAD C2I consists of four separate but interrelated efforts: Command & Control (C2) Hardware and Software, Ground Based Sensor, Masked Target Sensor, and Positive Hostile Identification equipment. FAAD C2I's Command and Control initial fielding to light forces will begin late FY93. Ground Based Sensor and one of the passive identification components are scheduled for initial fielding in FY94. Combined Arms Initiative (CAI) provides ground and aerial combat elements an enhanced capability for self defense against enemy helicopters. Air-to-Air Stinger is in production for the OH-58C/D. The Bradley Fighting Vehicle (BFV) sight reticle enhancement was incorporated in BFV production in May 1987. Engineering development continues on upgrading 120mm tank ammunition with an anti-helicopter capability.

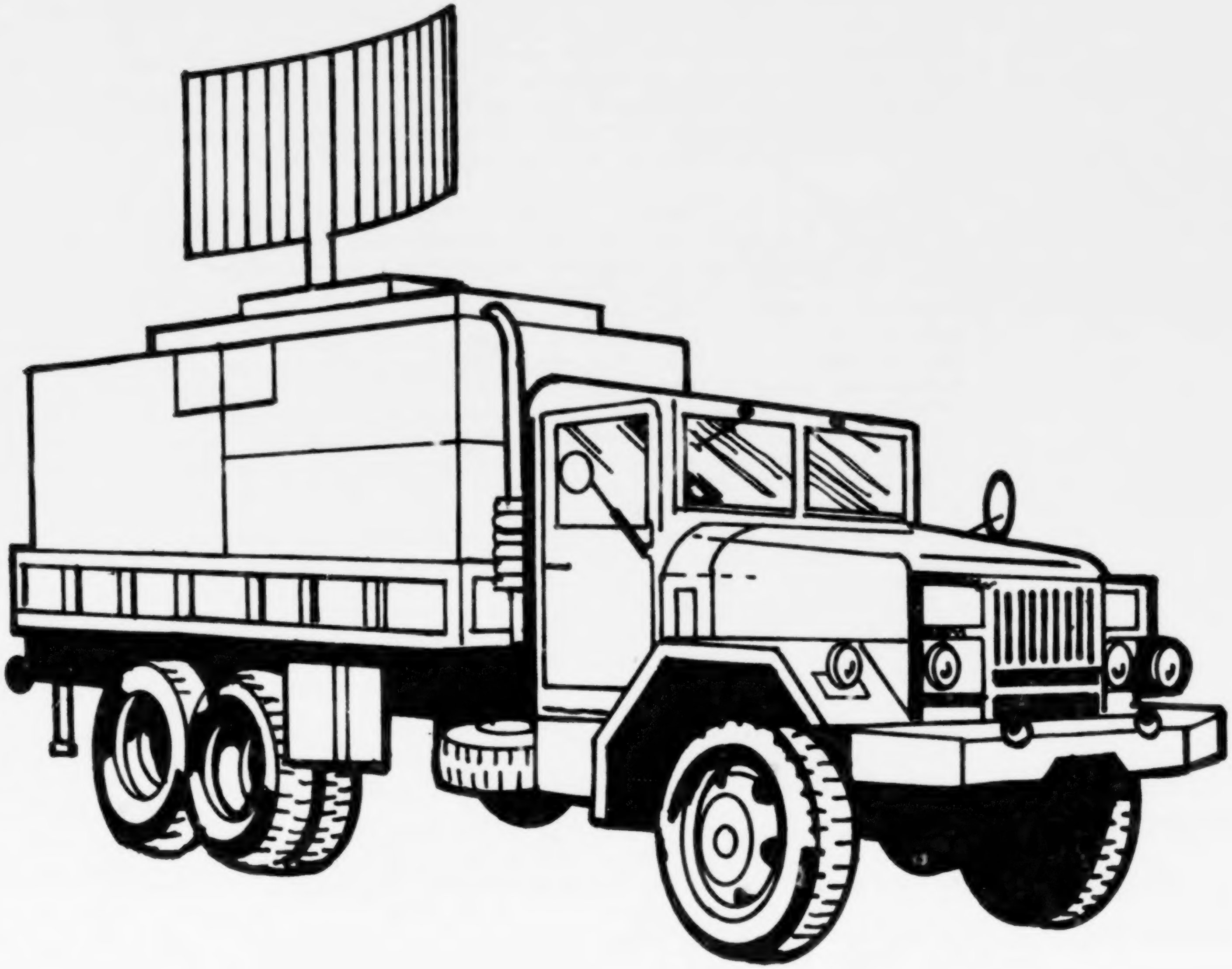
SOVIET COUNTERPART:

The Soviets have continued to deploy numerous Air Defense Systems in the Forward Area of the battlefield including the ZS6, ZSU-23/4, SA-8, SA-9, and continue to deploy and improve a robust integrated Air Defense Command, Control and Intelligence System.

CONTRACTORS:

LOS-F-H -- Martin Marietta (Orlando, FL)
FAAD C2 SOFTWARE--TRW (Redondo Beach, CA)
LOS-R -- Boeing Aerospace Co. (Huntsville, AL)
FAAD GROUND BASED SENSOR--TBD

Ground-Based Sensor (GBS)



Forward Area Air Defense (FAAD) Ground-Based Sensor (GBS)

MISSION:	The Forward Area Air Defense (FAAD) Ground-Based Sensor (GBS) is the key surveillance and target acquisition capability for division's FAAD system and its C2I component. The GBS consists of a radar based sensor system with its prime mover/power, Identification, Friend or Foe (IFF), Non-Cooperative Target Recognition (NCTR) devices, and C2I interfaces. GBS is the prime contributor to FAAD C2I's development of the air picture over the division area and beyond forward line of troops. Air targets include fixed and rotary wing aircraft with growth capabilities to acquire cruise missiles and RPV/UAVs. Its primary missions are to cue AVENGER fire units, protect friendly aircraft from fratricide, and provide targeting information to Line of Sight-Forward-Heavy (LOS-F-H).
CHARACTERISTICS:	FAAD GBS characteristics will be determined at conclusion of the ongoing Source Selection Evaluation and Testing phase.
SOVIET COUNTERPART:	None.
PROGRAM STATUS:	Industry candidate evaluation ongoing through 3QFY91 with contract award 1QFY92.
CONTRACTOR:	Unknown. Program still in candidate evaluation phase.

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LINE OF SIGHT-FORWARD-HEAVY (LOS-F-H)

MISSION:

The Line of Sight-Forward-Heavy (LOS-F-H) component of the Forward Area Air Defense System (FAADS) consists of an armored, tracked vehicle (XM1069, a derivative of the M3A2 Bradley) that integrates a missile system, communications equipment, and detection, identification and tracking sensors. The LOS-F-H will be located in forward battle areas, maneuver with the combined arms team and be used to protect tanks and infantry fighting vehicles from enemy helicopters and fixed-wing aircraft. The system will use radar and optics to detect, acquire and identify line-of-sight targets. The system will operate autonomously or using FAAD C2I data in day or night, in obscurants, in adverse weather and in battlefield environments where electronic and physical countermeasures are prevalent. The system is manned by a crew of three: a driver, a commander and a gunner. The commander uses the frequency agile radar to search for targets. Target detections are handed off to the gunner who tracks the target, automatically or manually, using the FLIR or TV sensors. When track is established and the target is identified, the gunner launches one of the eight on-board missiles, which is guided to the target via a receiver on the tail fins of the missile using a carbon dioxide laser. The missile's high speed and maneuverability severely limit threat reaction. Its dual-purpose impact/proximity fuze and highly lethal warhead minimize the threat's chances of survival.

SOVIET COUNTERPART

The Soviets have continued to deploy numerous Air Defense Systems in the Forward Area of the battlefield including the SA-8 and SA-9.

PROGRAM STATUS

The Martin Marietta Air Defense Anti-Tank System (ADATS) was selected on 30 November 1987 for the LOS-F-H role through a rigorous Non-Developmental Item Candidate Evaluation. The system has undergone technical and operational testing to fill data voids and provide the information needed for a production decision. The system met or exceeded all critical operational requirements except reliability. A two-year Reliability, Availability and Maintainability (RAM) Maturation Phase has been added to allow the system reliability to grow to the required values. ADATS will not be fielded if required reliability is not achieved. The system is projected to enter production in FY93 with First Unit Equipped (FUE) to occur in FY96.

CONTRACTORS

Martin Marietta Missile Systems (Orlando, FL) (Prime)

AVENGER

MISSION: To provide air defense support in all divisions, armored cavalry regiments, separate heavy brigades, and corps air defense brigades. AVENGER is designed to counter hostile low-flying, high-speed, fixed-wing aircraft and helicopters attacking or transiting the division. AVENGER fills the Line of Sight-Rear (LOS-R) portion of the Forward Area Air Defense System (FAADS).

CHARACTERISTICS: The AVENGER system consists of eight ready to fire Stinger missiles and a 50-caliber machine gun integrated with sensors and target acquisition devices. This integrated system provides all the necessary functions to perform day/night and adverse weather target detection, acquisition, tracking, target ranging and friend or foe aircraft identification with either the missile or the machine gun. The AVENGER's Standard Vehicle Mounted Launchers (SVMLs) interface and function with standard unmodified Basic Stinger, Stinger-POST and Stinger-RMP missile rounds. The system is mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) and its two man crew can fire on the move or operate the system remotely.

SOVIET COUNTERPART: The SA-9, introduced in the late 1960's, is the counterpart to AVENGER. It has approximately the same range and also uses an infrared homing guidance system. The SA-9 is mounted on a two-axle amphibious vehicle.

PROGRAM STATUS: The initial production contract was awarded competitively to the Boeing Aerospace Company in August 1987. The Secretary of the Army approved the AVENGER system for Type Classification - Standard in February 1990. The AVENGER went into full-scale production in April 1990.

CONTRACTOR: Boeing Aerospace Company (Huntsville, AL) - Production

Stinger

MISSION:

Stinger is a shoulder-fired, infrared homing missile system whose mission is to provide air defense coverage to combat units. The missile homes on the heat emitted by either jet or propeller-driven fixed-wing aircraft or helicopters. The system employs a proportional navigation system that allows it to fly an intercept course to the target. A Stinger crew visually acquires its target and electronically interrogates it to help determine if it is a friend. The missile notifies the gunner when it has a "lock" on the target. After trigger pull the Stinger is ejected from the tube by a small launcher motor. Once the missile has traveled a safe distance from the gunner, its main engine ignites and propels it to the target. Stinger is stored in a sealed tube, requires no maintenance in the field, and is designed to withstand the rigors of the battlefield. It is replacing the Redeye system. It can attack much faster targets than Redeye, and most importantly, can destroy aircraft from any aspect. A follow-on seeker (Stinger-POST) improves the capability of the system in certain infrared countermeasures environments. Stinger-Reprogrammable Microprocessor (RMP) further enhances the performance in infrared countermeasures environments and provides the capability to make future changes to the missile as the threat envolves through a replaceable software module.

SOVIET COUNTERPART:

Soviet Manportable Air Defense Systems are the SA-7, comparable to the U.S. Redeye, and the SA-14. The SA-7 has a range and altitude capability of approximately 3 km and only a tail chase capability. The SA-7 was used extensively in Vietnam and the Middle East and is deployed with maneuver units throughout the Warsaw Pact. The SA-14, fielded in the late 1970's, has similar performance characteristics to the Stinger. The SA-14 is replacing the SA-7. The SA-16, fielded in the 1980's, is replacing the SA-14.

PROGRAM STATUS:

Basic Stinger was operationally deployed to Germany in 1981 and to the 82nd Airborne Division in 1982. Basic Stinger production has been completed. Stinger-POST entered production in FY83, first deliveries were made in September 1986, and production was completed in August 1987. Stinger-POST missiles were deployed in FY87. Stinger-RMP entered development in September 1984, transition to production began in November 1985, and initial deliveries began in FY89; fielding began in FY90. The FY90 and FY91 RMP buys consist of competitive split procurement between prime and second source contractors.

CONTRACTORS:

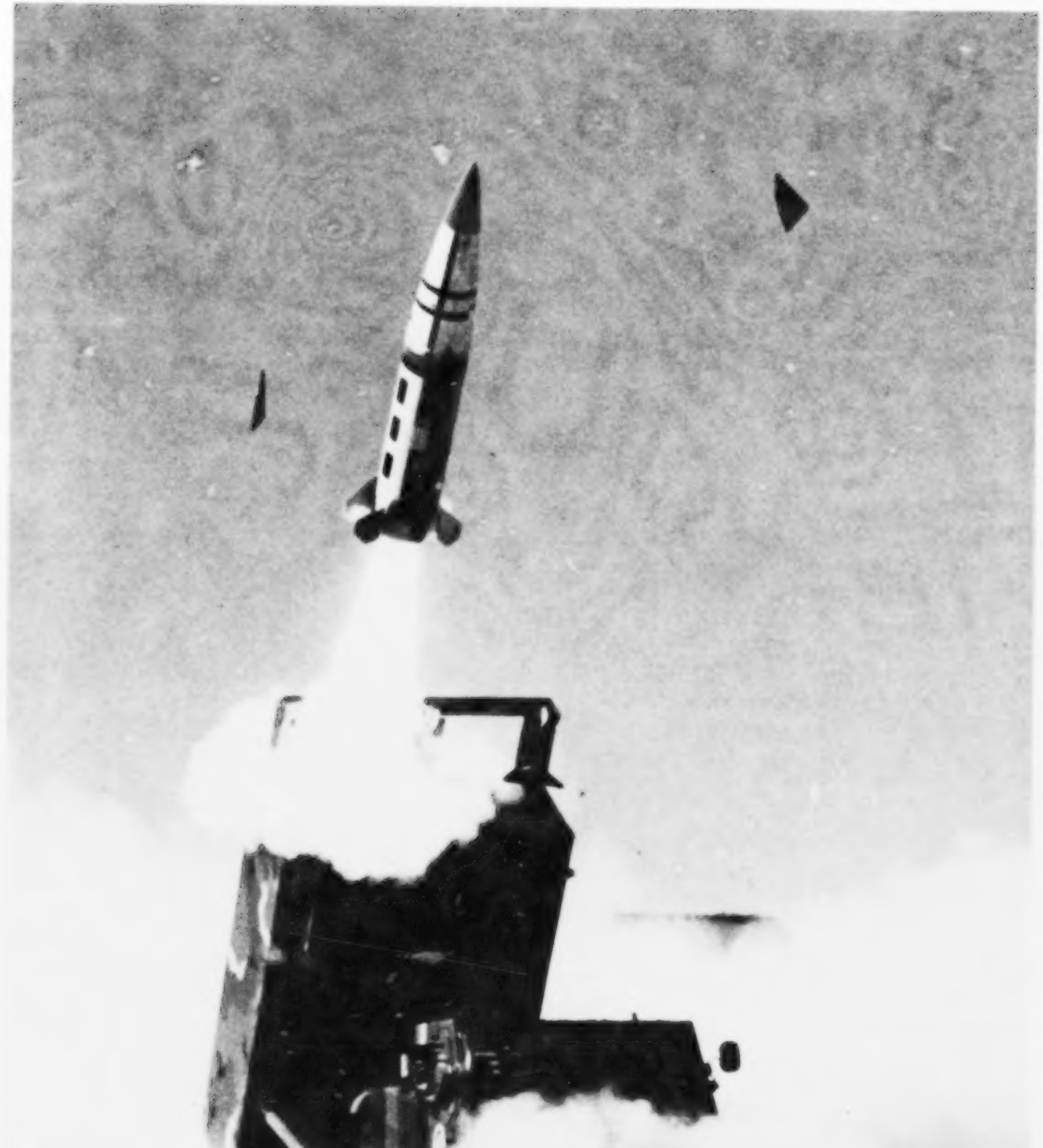
General Dynamics Valley Systems Division (Rancho Cucamonga, CA) (Prime)
Raytheon (Lowell, MA) (Second Source)

The Fire Support mission area includes those systems directly related to the generation of indirect firepower. This mission area includes fire support provided by cannons, rockets, and missile systems, and also the target acquisition and communication systems integral to field artillery operations.

FIRE SUPPORT

Multiple Launch Rocket System (MLRS)

MISSION:	The MLRS is a free-flight, area fire, artillery rocket system being fielded to fill an existing void in conventional fire support. The primary missions of MLRS are counterfire and suppression of enemy air defenses. MLRS supplements cannon artillery fires by delivering large volumes of firepower in a short time against critical, time-sensitive targets. The basic warhead carries improved conventional submunitions. A growth program is underway to add a Sense and Destroy Armor (SADARM) warhead to improve counterbattery fires. The MLRS M270 Launcher is being updated to accommodate launching a family of new munitions, including the ATACMS.
CHARACTERISTICS:	Warhead: Improved Conventional Munitions (ICM) Propulsion: Solid
SOVIET COUNTERPART:	The Soviets have a very effective multiple rocket capability with several sizes of rockets. A new system, believed to be similar in employment concept and size, but larger than MLRS, is in late stage development.
PROGRAM STATUS:	The U.S. Initial Operational Capability for MLRS was achieved in 1983. Starting in FY89, MLRS has been coproduced by the United States, United Kingdom, Germany, France and Italy. The second multiyear procurement contract for FY89-93 was awarded in July 1989.
CONTRACTORS:	LTV Aerospace and Defense (Dallas, TX) Norden Systems (Norwalk, CT) Atlantic Research (Camden, AR) Brunswick Corp (Camden, AR) Norris Industries (Los Angeles, CA) Bendix Corp (Teterboro, NJ)



Army Tactical Missile System (Army TACMS)

MISSION: ATACMS provides the Army a long-range missile weapon that operates in near all weather, day or night, is air transportable and capable of effectively engaging high priority land targets at ranges beyond the capability of cannons, rockets, and the Lance Missile System. The system will be used to attack tactical surface-to-surface missile sites, air defense systems, logistic elements, command/control/communication complexes, and second echelon maneuver units arrayed in depth throughout the corps area of influence.

CHARACTERISTICS: Army TACMS is a ground-launched conventional surface-to-surface semi-guided ballistic missile with an Anti-Personnel/Anti-Materiel (APAM) warhead. It is fired from the modified M270 MLRS launcher. The system utilizes the same targeting systems, engagement systems, and command and control systems as MLRS.

PROGRAM STATUS: Missile test flights began in 1988. Low Rate Initial Production (LRIP) began in FY89. The FY90 program was a second year of LRIP with Full Rate Production beginning in FY91.

CONTRACTOR: LTV (Dallas, TX) (Prime)

M109A6 Self-Propelled Howitzer, Paladin (Howitzer Improvement Program)

MISSION:

The M109A6, officially named Paladin, is an improved version of the M109-series 155mm self-propelled howitzer that was first fielded in the early 1960's. Like the earlier M109 models, the Paladin will provide the primary indirect fire support to the maneuver brigades of the armored and mechanized infantry divisions. The Paladin is air transportable in a C5 and is capable of firing both conventional and nuclear munitions. The Army began development of the Paladin in October 1985 as the Howitzer Improvement Program (HIP). The M109A6 modifications include: an on-board ballistic computer and navigation system, secure communications, a new cannon and mount, automotive improvements, improved crew Nuclear/Biological/Chemical (NBC) protection, driver's night vision capability, and built-in test equipment. The Paladin provides the Army a self-propelled howitzer with significantly improved responsiveness, survivability, lethality, and reliability.

CHARACTERISTICS:

	M109A2/A3	M109A6
Range:	23.5 w/Rocket Assisted Projectile (RAP) 18.1 km unassisted	30 km w/RAP 23.6 km unassisted
Weight:	56,000 lbs (Combat Loaded)	64,000 lbs (Combat Loaded)
Length:	29.9 ft	30.5 ft
Height:	10.8 ft	11.5 ft
Width:	10.3 ft	Same
Main Armament:	M185 155mm Cannon	M284 155mm Cannon
Secondary Armament:	Caliber .50 Machine Gun	Same
Crew:	6 (+3 in Accompanying Ammunition Support Vehicle)	4 (+3 in Accompanying Ammunition Support Vehicle)
Cruising Range:	220 miles (345 km)	Same
Ammunition:	All 155 mm ammunition except the M203 propelling charge	All 155mm ammunition

SOVIET COUNTERPART:

The Soviet 2S3 152mm self-propelled howitzer is considered comparable to the M109A2/A3 self-propelled howitzer in most performance characteristics.

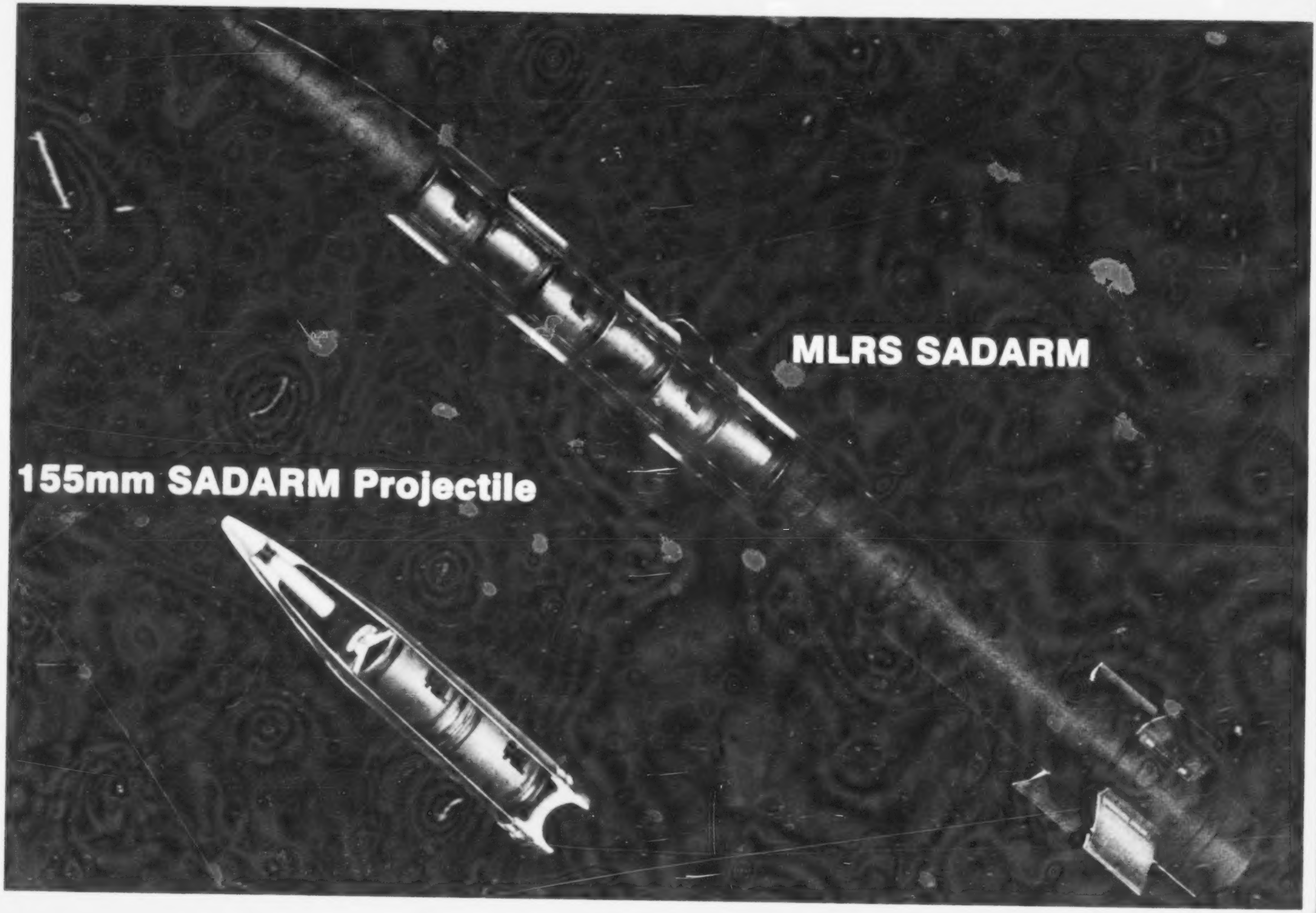
PROGRAM STATUS:

Six M109A6 prototypes were built in FY88. Low rate production begins in FY91 to achieve a First Unit Equipped date in FY93.

CONTRACTOR:

BMY, a division of HARSCO Corporation (York, PA)

The SADARM System


MLRS SADARM
155mm SADARM Projectile

Sense and Destroy Armor (SADARM)

MISSION:

SADARM is a comparatively low cost, sensing submunition designed to detect and destroy lightly armored vehicles, primarily self-propelled artillery. SADARM is the first of the Army's new family of fire and forget "SMART" munitions. The submunition is launched from 155mm howitzers or via the Multiple Launch Rocket System (MLRS). After launch, the submunition is dispensed from its carrier over the target area and detects appropriate targets using a dual mode (combination millimeter wave and infrared) sensing mechanism. Once a target is detected, SADARM fires an explosively formed penetrator, which travels at an extremely high velocity to penetrate the top of target vehicles.

CHARACTERISTICS:

	155mm	MLRS
Caliber:	5.8 in	6.9 in
Weight:	26.4 lbs	30.8 lbs
Range:	18/22 km*	32 km*
Number Submunitions:	2	6

*Range of delivery system; other characteristics apply to submunition.

SOVIET COUNTERPART:

There is no known Soviet Counterpart.

PROGRAM STATUS:

SADARM was approved in March 1988 to enter Full Scale Development (FSD). Production is projected for 1993. SADARM is scheduled to be fielded in FY94 in 155mm and FY95 in MLRS.

CONTRACTORS:

Alliant (Minneapolis, MN)
Aerojet (Azusa, CA)

M119 105mm Howitzer

MISSION:

The M119 is a non-developmental item procurement of the L119 British Light Gun. The M119 is a lightweight, 105mm, towed howitzer that improves fire support for the Army's Airborne, Air Assault and Light Infantry Divisions and Separate Brigades. It will replace all M102 howitzers in the active force. The M102s will then be used to replace all remaining M101A1 howitzers. It will fire all conventional 105mm ammunition in the inventory, the DPICM 105mm ammunition scheduled for development, and the High Explosive Rocket Assisted (HERA) ammunition now in production. It is airmobile with the UH-60 Black Hawk helicopter and its prime mover is the High Mobility Multipurpose Wheel Vehicle (HMMWV).

CHARACTERISTICS:

Range (kilometers):	14.9 DPICM, 14.3 HE, 19.5 HERA
Weight:	4,000 pounds
Width:	5 feet, 10 inches
Length:	20 feet, 1 1/2 inches
Height:	4 feet, 6 inches (Traveling Configuration)
Crew:	7
Ammunition:	HE, Smoke, Illumination, HERA

SOVIET COUNTERPART

The nearest Soviet counterpart is the D-30 122mm howitzer. It is fielded in Soviet, Warsaw Pact, and other armies. Its range is 15.4 kilometers, weighs 7,000 pounds, and requires a crew of 7 personnel. The 122mm projectile is significantly more lethal than the 105mm.

PROGRAM STATUS

Fielding of the first unit was conducted in December 1989 to the 7th Infantry Division, Ft Ord, California. Fielding of the British produced howitzers will be completed in 2QTRFY91. All remaining fielding will be of the U.S. produced M119 howitzers. The first three U.S. produced howitzers were delivered for production qualification testing which is currently scheduled for 2QFY91.

CONTRACTORS

Royal Ordnance, United Kingdom (Offshore production)
U.S.: Watervliet Arsenal, NY
Rock Island Arsenal, IL

Firefinder Radars
Artillery Locating Radar (AN/TPQ-37) and Mortar Locating Radar (AN/TPQ-36)

MISSION:

FIREFINDER radars enable friendly forces to locate and bring immediate fire upon enemy mortar, artillery, and rocket-launching positions, silencing them before they can adjust their fires on friendly units and positions. The world's first automatic hostile-weapon-locating systems, FIREFINDER radars use advanced phased array antenna techniques with computer-controlled signal processing. They function by spotting enemy projectiles in flight and mathematically backplotting their trajectory. The position of the weapon is reported in grid coordinates that can be fed automatically into artillery fire centers, enabling them to target the enemy weapons with guns, rockets, or other ordnance. Upon fielding of the Army Data Distribution System (ADDS), the link from the radars to fire direction centers will communicate this position data on a near real-time basis. In tests, both radars, in combination with fire control devices, enabled an artillery unit to have accurate counterfire on the way before the first enemy projectile struck the ground. In actual combat action in Lebanon (1984), the AN/TPQ-36 performed equal to or better than the test results. Each Army division is being equipped with two artillery locating radars and three mortar locating radars.

SOVIET COUNTERPART:

The closest Soviet counterpart to FIREFINDER radars is the ARK-1, a system with significantly less capability.

PROGRAM STATUS:

Fieldings of the AN/TPQ-36 and AN/TPQ-37 to the Active Army were completed in October 1990. Fieldings to the last three Army National Guard units were delayed due to Operation DESERT STORM requirements, but are scheduled for completion by the end of FY91. The AN/TPQ-36 modification program is in progress. Phase I reconfigures to HMMWVs for greater transportability and adds a self-survey capability. FUE is scheduled for 4QFY91, three months ahead of schedule. Phase 2 begins in FY92 and eliminates the operations shelter, while significantly improving the overall operation of the system. Advanced FIREFINDER is a conceptual R&D program with a projected FUE in FY02 that will provide a highly survivable, state-of-the-art radar to replace AN/TPQ-37 and AN/TPQ-36 systems in the Active Army.

CONTRACTOR:

Hughes Aircraft Company (Prime) (Fullerton, CA)
AN/TPQ-36 Phase I Modification: Sacramento Army Depot (SAAD)

Combat Support is an aggregation of the following mission areas dedicated to providing operational assistance to combat arms.

(1) Engineer Support relates to combat engineer efforts and mine/countermine warfare.

(2) NBC relates to supporting combat operations in a nuclear, biological, chemical environment

(3) Theater Tactical Intelligence relates to providing theater/tactical commanders with intelligence and information to support planning, the conduct of combat operations, and the readiness of forces combat operations.

COMBAT SUPPORT

5-62AD
C-35

High Mobility Multipurpose Wheeled Vehicle (HMMWV)

MISSION:

The HMMWV is a light, highly mobile, diesel powered, four-wheel drive tactical vehicle that uses a common 1 1/4 ton payload chassis. The HMMWV can be configured through the use of common components and kits to become a cargo/troop carrier, armament carrier, S250 shelter carrier, two or four litter ambulance, or TOW missile carrier. The HMMWV provides a successor to the 1/4 ton Jeep, M718A1 Ambulance, 1/2 ton M274 Mule, 1 1/4 ton Gamma Goat, and M792 Ambulance. The HMMWV is a Tri-Service program that also provides vehicles to satisfy Marine Corps and Air Force requirements. The HMMWV program is complementary to the 1 1/4 Ton Commercial Utility and Cargo Vehicle (CUCV) Non-developmental Item (NDI) program. Other developmental models include prime mover for the light howitzer, towed VULCAN systems, and heavy variant shelter carriers.

CHARACTERISTICS:

	Cargo/Troop Carrier	Armament Carrier	TOW Carrier	Ambulance Carrier	S250 Carrier	Heavy Variant
Curb Weight:	5200	5960	6051	7180	5483	5600
Payload, lbs	2500	2240	2149	1920	3177	4400
GVW, lbs	7700	8200	8200	9100	8660	10000
Crew/Cab	2/4	4	4	2/4(litters)	2	2/4
Length, inches	180	180	180	203	188	180
Height, inches	72	74	72w/o Launcher	105	104	72
Width, Inches	85	85	85	85	85	85
Trailer Towing Capacity:	3400 lbs					4200 lbs
Range:	300 miles					

SOVIET COUNTERPART:

No known Soviet counterpart.

PROGRAM STATUS:

A new five-year multiyear letter contract was awarded in August 1989. The total multiyear quantity is approximately 33,000 vehicles.

CONTRACTOR:

LTV Missile and Electronics Group, AM General Division (South Bend, IN)

M9 Armored Combat Earthmover (ACE)

MISSION:

The M9 ACE is a highly mobile (tracked), amphibious armored earthmoving vehicle that can move, survive, and work with the flow of battle, responding immediately to the maneuver commander's need for elimination of enemy obstacles, creation of obstacles to enemy maneuver, preparation of fighting positions for the fighting forces, expedient antitank ditching and maintenance of roads and supply routes. The ability to perform these tasks in the highly lethal and mobile AirLand battlefield assures that friendly force momentum is maintained in the offense, that enemy forces are slowed, channelized and made more susceptible to friendly fire in the defense while providing protected positions from which our weapon systems can fight. Digging, dozing, hauling, scraping, grading and earthmoving tasks can be accomplished further forward on the battlefield than ever before. Its highly mobile (tracked), amphibious, light armored capabilities make this earthmover tough enough to live and fight with the infantry and fast enough to move with tanks. The M9 ACE is an essential force multiplier and a key member of the combined arms team on the AirLand battlefield.

CHARACTERISTICS:

Weight (Empty)	36,000 lbs
Loaded:	54,000 lbs
Speed:	30 mph
Air Transportable:	C-130, C-141B, C-5B aircraft
Amphibious:	3 mph
Survivable:	Small arms, artillery fragmentation, and operator NBC protection.

SOVIET COUNTERPART

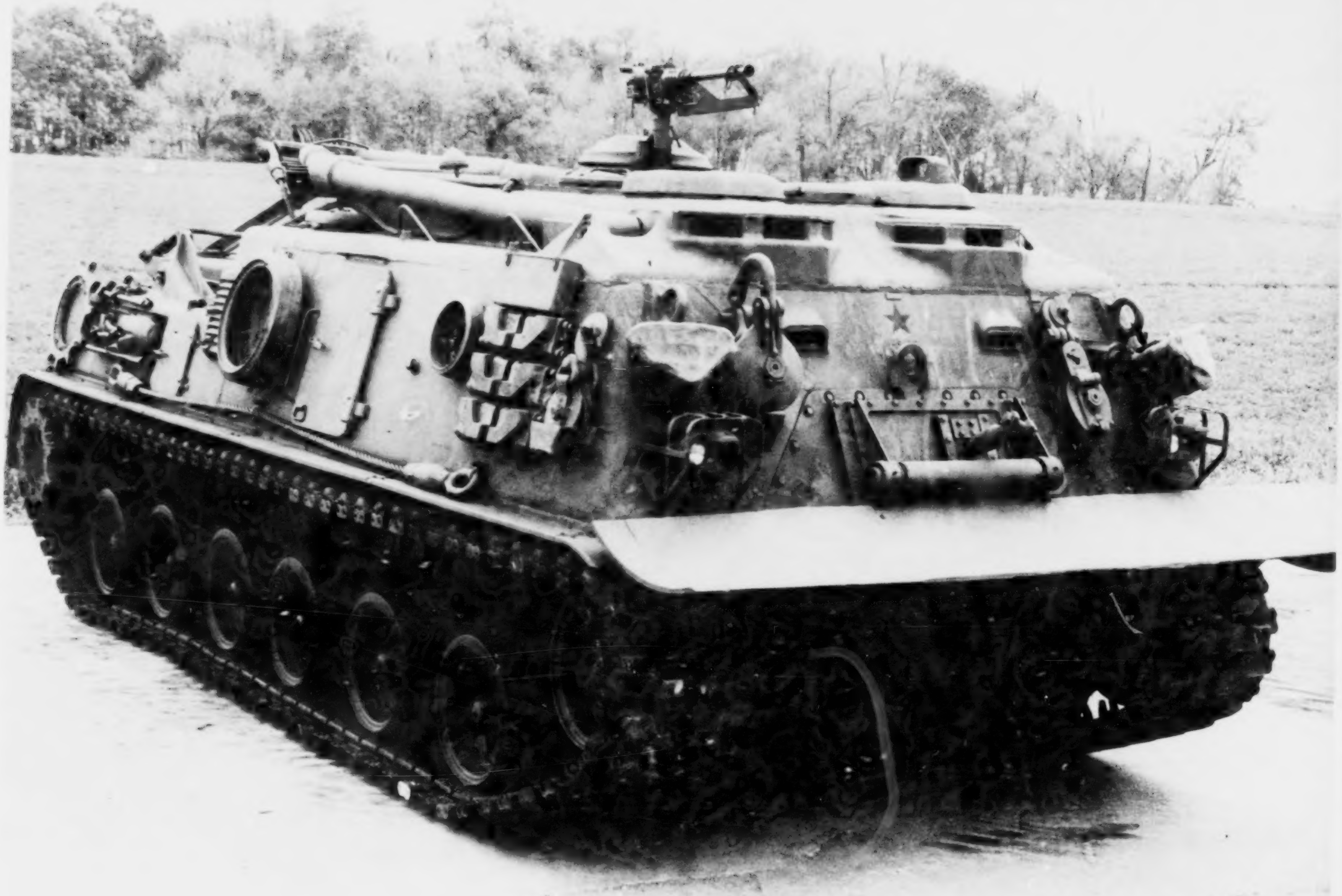
Although the Soviets have no direct counterpart to the M9 ACE, they do employ several pieces of equipment, each fielded in large quantities, which presently give Soviet combat units at least twice the engineer support of comparable U.S. units. Examples are their MDK series of ditching machines, the BAT/M heavy, tracked dozer and the IMR Armored Engineer Tractor. The latter consists of a T-55A tank chassis with hydraulically controlled higed blade, crane with telescoping boom, armored cupola and internal overpressure system. The Soviets are in their third or fourth generation fielding of these items.

PROGRAM STATUS:

The 7th Infantry Division (Light) was the first unit equipped with seven of the low rate initial production (LRIP) vehicles. The training base (TRADOC) received three LRIP vehicles in November 1986. Initial production testing was completed during the June-August 1988 time frame. Deliveries of the full production vehicles to the field began in the June-October 1989 time frame. The FY90 contract option for 132 vehicles was not exercised. Due to Operation DESERT STORM, the M9 ACE was fielded to SWA units in November-December 1990.

CONTRACTOR

BMY, a Division of HARSCO Corp (York, PA)



M88A1 Medium Recovery Vehicle

MISSION:

The M88A1 is a full-tracked, armored vehicle designed for hoisting, winching and towing operations to effect battlefield recovery and evacuation of tanks and other tracked combat vehicles. The M88A1 is the primary recovery vehicle in the Army inventory for M1 Abrams tank, M2/M3 Bradley Fighting Vehicles, M60 series tanks, and heavy self-propelled artillery.

CHARACTERISTICS:

Length:	325 inches	Power Train:	12-cyl, 750 hp air-cooled diesel engine with 3 speed automatic transmission
Width:	135 inches		
Height:	123 inches		
Weight:	56.0 tons	Cruising Range:	300 miles
Top Speed:	30 mph; 17 mph with towed load	Draw Bar Pull:	90,000 lbs
Armament:	One .50 cal machinegun	Boom Capacity:	25 tons

SOVIET COUNTERPART:

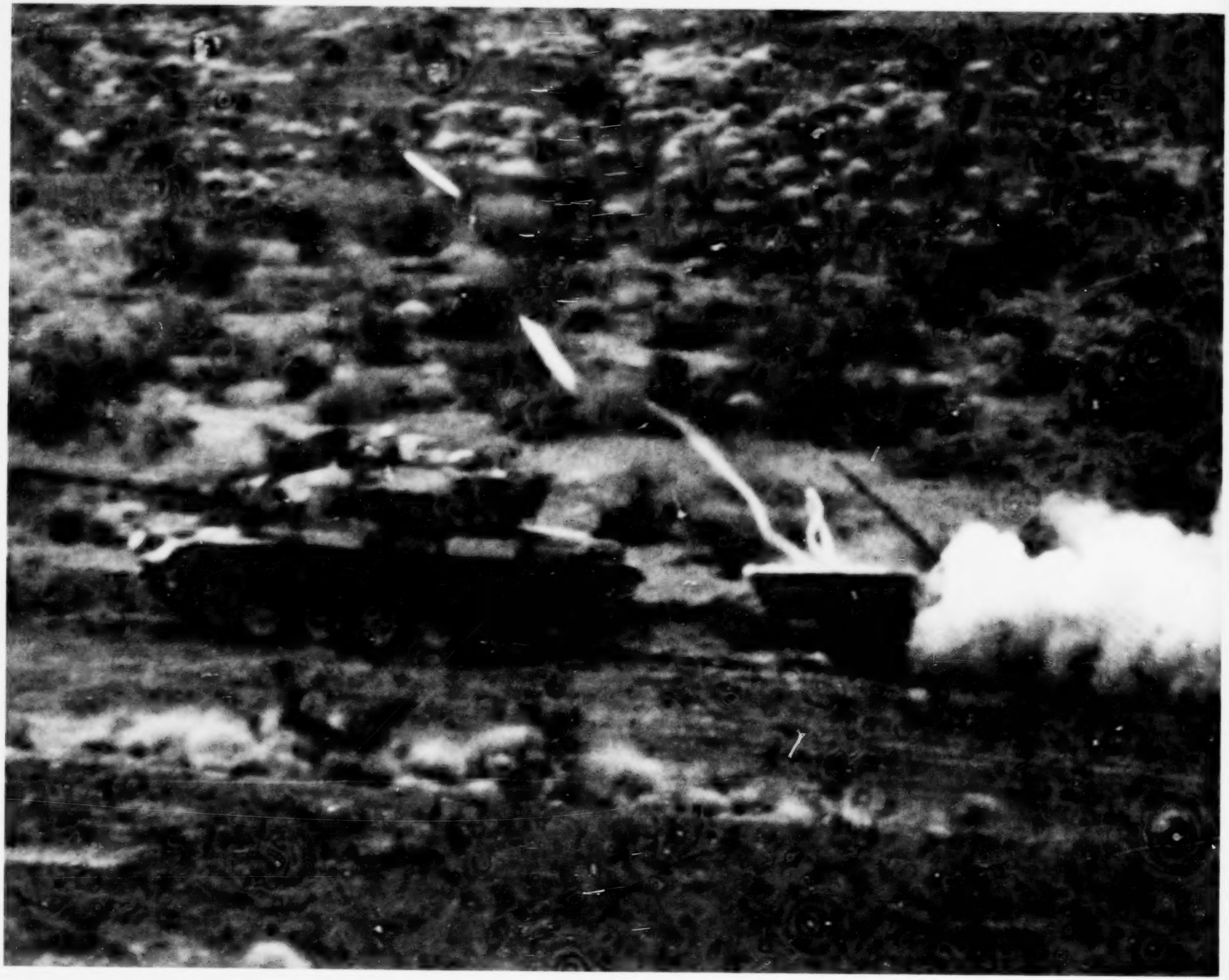
The Soviets have historically based recovery vehicles on existing chassis design. The most current is the BREM-1 based on a T-72 chassis. T-54, T-55-%, and JSU-T recovery vehicles are still in the Soviet inventory.

PROGRAM STATUS:

Conversion of all M88s in the U.S. Army to M88A1s was completed in February 1982. Deliveries of the M88A1 were completed in 1989. No further procurement is programmed. There are approximately 2500 M88A1s in the Army inventory.

CONTRACTORS:

BMY Company (York, PA)
GMC, Detroit Diesel Allison Div. (Indianapolis, IN)
Teledyne Continental Motors (Muskegon, MI)
Firestone Tire (Moblesville, IN)
Goodyear Tire (St. Marys, OK)
Standard Products (Port Clinton, OH)
Bata Engineering (Batawa, Ontario, Canada)
Adviondack (Watervliet, NY)
Buckeye Steel Casting (Columbus, OH)
Ferguson Gear (Gastonia, NC)
Berwick Forge (Berwick, PA)
Maynard Steel Casting (Milwaukee, WI)



Mine Clearing Line Charge (MICLIC)

MISSION:

Army ground combat forces require a system which can be rapidly deployed by engineer units to clear lanes in minefields. Operations must be capable of being conducted under enemy fire and in daylight or darkness. The Army is acquiring the U.S. Marine Corps Trailer-Mounted M58 Line Charge System, which consists of the M58 high explosive (HE) linear demolition charge, the Mark 22 rocket (5 inch) for projecting the explosive charge across the minefield, a rocket launcher with firing kit, and the standard Army M353 trailer or M200A1 trailer. The M68 inert linear charge is used for training. The charge is contained in a box which is cradled on the rocket launcher. The launcher, in turn, mounts on the trailer. The assumbled system is towed by a light forces engineer 5-ton vehicle to about 50 meters from the edge of a minefield and the rocket is fired pulling the line charge across the minefield with it. In heavy forces, the MICLIC is towed by a tank or engineer M113 Armored Personnel Carrier. After the line charge is resting across the minefield, the operator detonates it, thus neutralizing mines along the 110 meter length of the line charge and 4 meters on both sides. Three MICLIC systems will be issued to each engineer company in Divisional and Corps Combat Engineer Battalions.

CHARACTERISTICS:

System Weight:	2.5 tons
Explosive Line Charge:	Length-110 meters; weight - 1850 lbs
Dimensions of Minefield Breach:	8 meters x 100 meters

SOVIET COUNTERPART:

The Soviets have fielded the M1979, second generation tracked explosive mine breaching system. The M1979, assigned to Soviet Divisional Engineer Battalions, performs similarly to the U.S. MICLIC, clearing a lane approximately 8 meters by 75 meters with a demolition charge.

PROGRAM STATUS:

The USMC MICLIC began production in FY83. The Army procurement began in FY86. Fielding is complete in U.S. Army Europe (USAREUR) and 8th Army (Republic of Korea), and ongoing in Forces Command (FORSCOM).

CONTRACTORS:

Thiokol, Inc. (Shreveport, LA)
Martin Marietta Ordnance System, Inc. (Milan, TN)
Mark 22 Rockets (Naval Ordnance Station, Indianhead, MD)

Multiple Delivery Mine System (VOLCANO)

MISSION:

VOLCANO is a rapid mine dispensing system. It incorporates the GATOR antitank and antipersonnel mines. These mines are pre-loaded into canisters which can be placed in standard dispenser racks for Army helicopter or ground vehicle use. VOLCANO is composed of mounted launcher racks with mounting hardware, an electrical dispenser control unit and the mine canisters. VOLCANO provides a rapid and flexibile means of placing tactical minefields to delay, canalize, and interdict attacking enemy forces. The helicopter system, which will replace the M56 helicopter delivered mine, will permit low altitude, reduced vulnerability delivery of 960 mines by a single Black Hawk (UH-60A). Five-ton cargo and dump trucks and Tracked Cargo Carrier, M548 mounting similar dispensing systems will also deliver 960 mines to create tactical minefields. Air systems will be issued to combat aviation companies and ground systems to divisional and corps combat engineer companies. Mine canisters will be supplied within the Class V supply system.

CHARACTERISTICS:

VEHICLES	NUMBER OF SYSTEMS	NUMBER OF CANISTERS	NUMBER OF MINES
UH-60A Black Hawk	One-4 Racks	160	960
M817 5-Ton Dump Trk	One-4 Racks	160	960
M814 5-Ton Cargo Trk	One-4 Racks	160	960
M548 Trk Cargo Carrier	One-4 Racks	160	960

SOVIET COUNTERPART:

The Soviets can deliver mines from helicopters and ground vehicles, but their systems are not directly comparable to the VOLCANO.

PROGRAM STATUS:

The VOLCANO has been in procurement since FY87 to meet the urgent requirement for Scattermine Systems in the motorized and light infantry divisions.

CONTRACTORS:

Alliant Techsystems (Edina, MN)
Brunswick Corp (Marion, VA)

U.S. AIR FORCE

Joint Surveillance and Target Attack Radar System (Joint STARS)

MISSION:

Joint STARS is a battle management and targeting system which detects, locates, tracks, classifies and assists in attacking both moving and stationary targets beyond the Forward Line of Troops (FLOT). This allows the commander to DECIDE (situation intelligence), DETECT (targeting intelligence), and DELIVER (trigger delivery of ordnance, direct attack aircraft or counter enemy movements by maneuver of friendly forces). The Air Force is responsible for the Prime Mission Equipment (PME): platform, radar, data link. The Army is responsible for the Ground Station Modules (GSM)--tactical data processing and evaluation distribution centers that link the Joint STARS radar (through the data link) to Army C3 nodes at corps and division levels. The GSM will process Joint STARS and OV-1D Mohawk radar data. Plans are underway to enhance the GSM to process imaging data from unmanned aerial vehicles and NATO airborne radars. Situation development information is transmitted through the All Source Analysis System (ASAS) and targeting information is transmitted through the TACFIRE/AFATDS system to their respective users. The GSM program will develop and incorporate nuclear/blast hardening and NBC filtering into a Block II GSM configuration.

CHARACTERISTICS:

Detection range:	In excess of 100 km into hostile territory
Aircraft:	E-8 (militarized Boeing 707)
Target:	Moving, fixed, tank-sized targets

SOVIET COUNTERPART:

The Soviets have a variety of airborne radar systems; however, there is no know Soviet system comparable to Joint STARS.

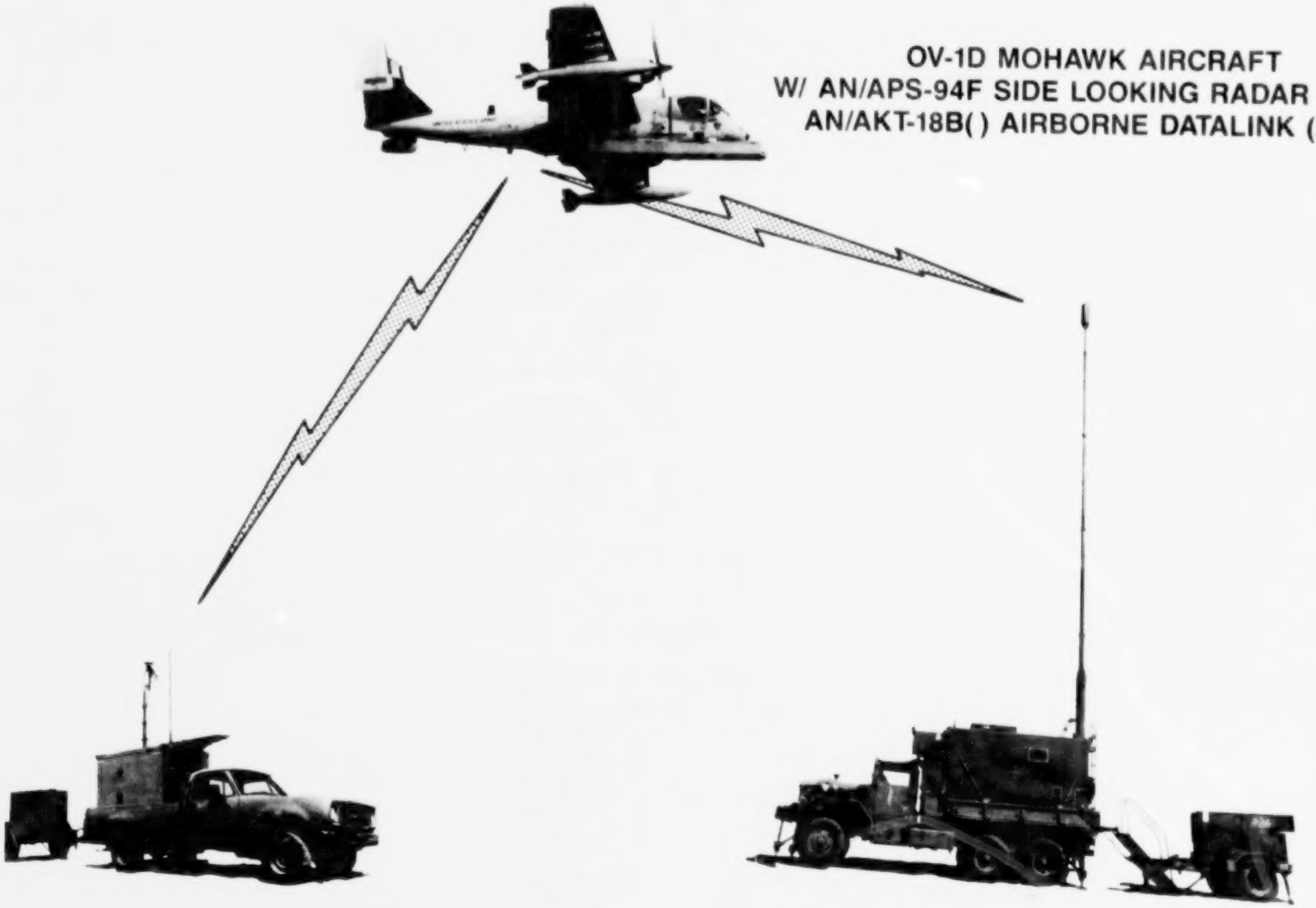
PROGRAM STATUS:

The PME and GSM are in Full Scale Engineering Development. There is also a Limited Procurement Urgent (LPU) of 9 GSMs which serve as ground stations for the Army's current OV1D Side Looking Airborne Radar (SLAR) system. A limited operational field test demonstration with the fully operational GSM and a full scale development platform radar was successfully completed in fall 1990.

CONTRACTORS:

Motorola Corporation (Scottsdale, AZ) (Ground Station)
Honeywell, Incorporated (Minneapolis, MN) (Simulator/Trainer)
Grumman Aerospace (NY/Melbourne, FL) (PME)
Norden Systems Division of United Technologies (Norwalk, CT) (PME)

AN/UPD-7 RADAR SURVEILLANCE SYSTEM



OV-1D MOHAWK AIRCRAFT
W/ AN/APS-94F SIDE LOOKING RADAR (SLAR)
AN/AKT-18B( ) AIRBORNE DATALINK (ADL)

AN/TKQ-2B( )
GROUND STATION TERMINAL (GST)

AN/TSQ-132( )
GROUND STATION MODULE (GSM)

OV-1D (MOHAWK) Surveillance System

MISSION:

The OV-1D MOHAWK is a two place, twin turboprop, combat aircraft equipped with Side-Looking, Airborne Radar (SLAR) (AN/APS-94F) and photographic (KA-60/76) cameras capable of monitoring enemy movement in daylight, darkness, and inclement weather. The primary sensor is the AN/UPD-7 airborne radar surveillance system. When used in conjunction with a data link, the radar information is transmitted to a ground based receiving system which has the capability to convert the received signals back to film for near real time viewing analysis. The AN/UPD-7 system is capable of interfacing with the Ground Station Module (GSM) of JSTARS.

CHARACTERISTICS:

	SLAR Equipped OV-1D
Mission Weight:	18,587 lbs
Cruise Speed:	210 knots
Endurance:	4.0 hours
Maximum Range:	820 nautical miles
Crew:	2
Armament:	Not Applicable
Payload (mission equipment)	2,129 lbs

PROGRAM STATUS:

The OV-1D is currently deployed in Military Intelligence Battalions (Aerial Exploitation): three Outside Continental United States (OCONUS), two in Forces Command (FORSCOM), and two in the National Guard. The Army's fleet of OV-1D and associated RV-1D aircraft are scheduled for retirement in FY97.

CONTRACTORS:

Grumman Aerospace (Stuart, FL)
Motorola Inc. (Scottsdale, AZ)
Lycoming (Stratford, CT)

Quickfix

MISSION:

Quickfix is a tactical heliborne communications intercept, direction finding and jamming system. Quickfix consists of: AN/ALQ-151 intercept and direction finding mission equipment, AN/TLQ-17A communications jammer, and airborne self-protection equipment mounted in a modified UH-60A helicopter. The authorized allowable list is three systems per division and armored cavalry regiment. Fielding of 66 systems was completed in April, 1990.

CHARACTERISTICS:

	EH-60A
Mission Gross Weight (lbs)	16,500
Cruise Speed:	137 knots
Endurance:	2.0 hours
Maximum Range:	266 nautical miles
Crew:	4
Armament:	Not Applicable
Payload (mission equipment):	2,130 lbs

SOVIET COUNTERPART:

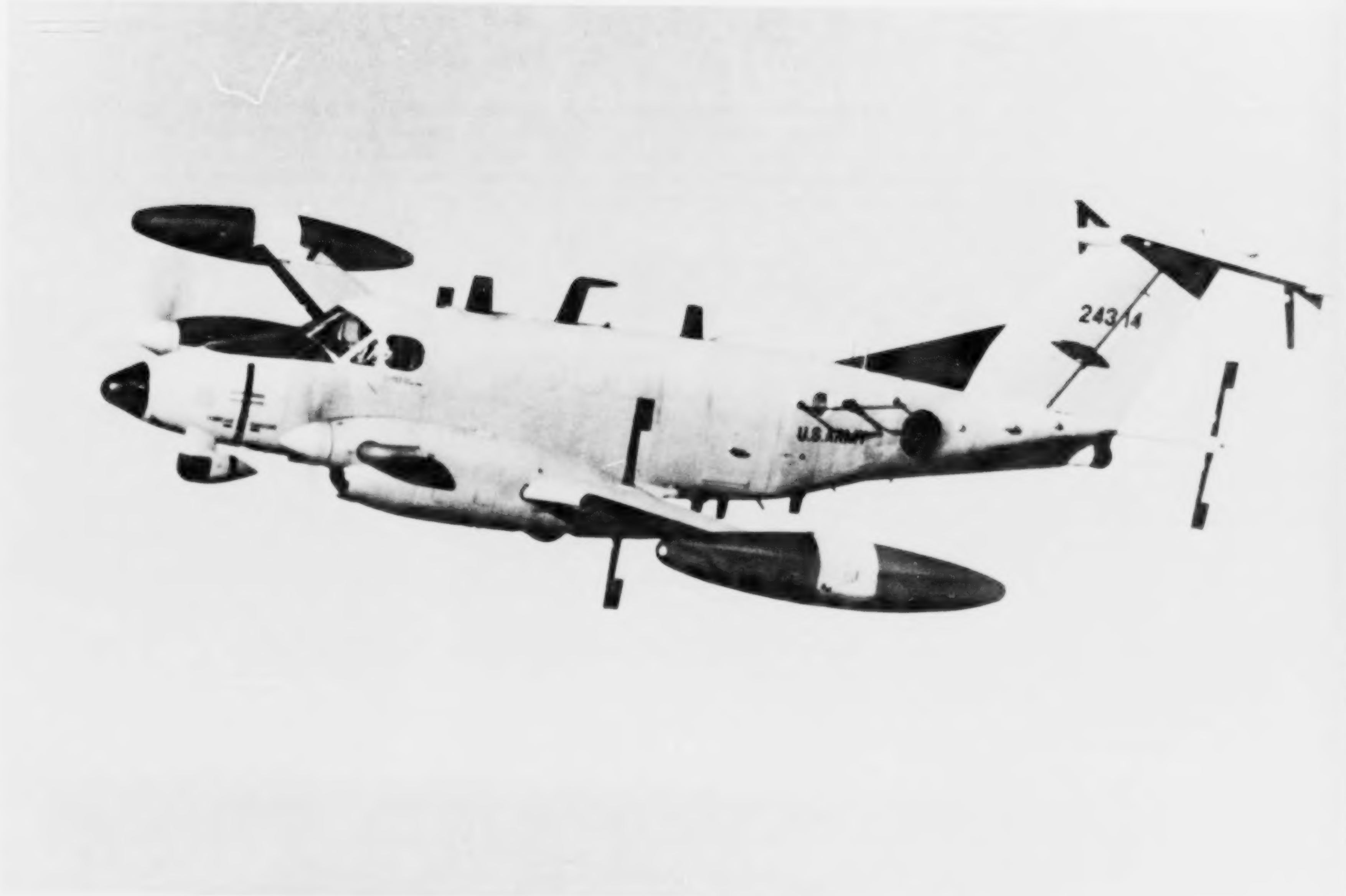
The Soviets have fielded an extensive fleet of dedicated MI-8 HIP J/HIP K electronic warfare helicopters.

PROGRAM STATUS:

Current material changes to the fleet include host interface unit for connectivity with the Tactical Control and Analysis Center and All Source Analysis System and capability for netting with TEAMMATE. Block improvements will evolve Quickfix into Advanced Quickfix. The improved system will accommodate rapid technology insertion and use of modules common to the intelligence and electronic warfare family of systems.

CONTRACTORS:

Electromagnetic Systems Laboratories, Inc. (Sunnyvale, CA)
Sikorsky Aircraft (Stratford, CT)
TRACOR, Inc. (Austin, TX)


24314
U.S. ARMY

GUARDRAIL/COMMON SENSOR

RC-12

GUARDRAIL

MISSION:

Fixed wing communication intercept and direction finding. Provide corps and division commanders the ability to influence the enemy's decision cycle, and to target and destroy command, control, and communications nodes and radar. GUARDRAIL applications include follow-on force attack, contingency, counter insurgency operations and counternarcotics surveillance. GUARDRAIL systems currently in active Army service include the GUARDRAIL V (RU-21H aircraft), the Improved GUARDRAIL V (RC-12D aircraft), and the GUARDRAIL Common Sensor Minus (RC-12H aircraft).

CHARACTERISTICS:

	RU-21H	RC-12D/H	RC-12K
Mission Weight:	10,200 lbs	14,200 lbs	16,000 lbs
Cruise Speed:	176 knots	200 knots	250 knots
Endurance:	4.0 hours	5(+) hours	5(+) hours
Maximum Range:	1,000 nautical miles	1,200 nautical miles	1,200 nautical miles
Crew:	2	2	2
Armament:	Not Applicable	Not Applicable	Not Applicable
Payload (mission equipment):	1,126 lbs	1,600 lbs	2,200 lbs

SOVIET COUNTERPART:

The Soviets have a wide variety of airborne and ground-mounted electronic warfare systems. There is no known Soviet system comparable to GUARDRAIL, although the AN-12 CUB C performs similar missions.

PROGRAM STATUS:

A follow-on capability to the Improved GUARDRAIL V (IGRV) system is currently in production and will begin fielding in 3QFY91 to replace older GUARDRAIL systems. The system is called GUARDRAIL Common Sensor (GR/CS). GR/CS (RC-12K aircraft) combines the IGRV COMINT sensor package with an electronics signals (ELINT) intercept, classification, and direction finding capability and a communication high accuracy airborne location system (CHAALS).

CONTRACTORS:

ESL, Inc. (Sunnyvale, CA)
Beech Aircraft (Wichita, KS0
Emerson (St. Louis, MO)
IBM (Oswego, NY)
UNISYS (Salt Lake City, UT)

Black Hawk

MISSION:

The UH-60 Black Hawk is replacing the UH-1 "HUEY" in air assault, air cavalry, and aeromedical evacuation missions. The Black Hawk can carry more than twice the UH-1 payload and is capable of transporting an entire 11-man, fully equipped squad faster and in most weather conditions. The Black Hawk is the first utility/assault helicopter that adds to the Army's Division level mobility; for example, it can reposition a 105mm howitzer, its crew of 6, and up to 30 rounds of ammunition in a single lift. Its critical components and systems are armored or redundant to enable it to withstand multiple small arms hits, and its airframe is designed to progressively deform on impact to protect the crew and passengers in a crash. Advanced technology in the Black Hawk makes it easier to maintain in the field than any other helicopter in the world. Black Hawks' full squad carrying ability significantly improves the small-unit commander's ability to retain control of his forces under combat conditions, and permits more rapid replacement of ammunition and other combat consumables in a high intensity war.

CHARACTERISTICS:

Max Gross Weight:	20,250 lbs
Cruise Speed:	150 knots
Maximum Range:	330 nautical miles
Crew:	2 pilots, 1 crew chief
Armament:	Two 7.62mm machine guns
Payload:	2640 lbs (or 11 combat equipped troops) at 4000 feet/95 degrees F

NOTE: Performance characteristics at primary mission weight of 16,953 lbs.

SOVIET COUNTERPART:

The HIP series, much slower and used by the Soviets as a troop carrier and general cargo transport, can carry up to 24 troops.

PROGRAM STATUS:

Black Hawk is being procured under a four-year, fixed-price multiyear contract covering FY88 to FY91. The Army has fielded the UH-60A Black Hawk to high-priority units in the continental United States (CONUS), Europe, Korea, Panama, and U.S. Army Western Command (WESTCOM). The UH-60L is the current production configuration and includes an improved durability main gearbox, and a more powerful engine, the new T700-GE-701C. The UH-60 is planned for a major integration into the Army National Guard and Army Reserve units beginning in 1992. A dedicated procurement program has been approved which will provide 300 UH-60s as part of the overall plan for upgrade of the Army National Guard equipment in FY92-96.

CONTRACTORS:

Sikorsky (Stratford, CT)
General Electric (West Lynn, MA)

CH-47 Modernization

MISSION:

The CH-47 Chinook, the Army's only medium-lift helicopter, is a twin-engine, tandem rotor, cargo helicopter. Designed in the 1950's and fielded in 1962, the CH-47's primary missions are movement of ammunition, repair parts, petroleum and tactical movement of artillery, troops, and special weapons on the battlefield. In 1975 a modernization program was approved to upgrade the CH-47A, B, and C models into a new "D" model configuration. These improvements extend the useful life of the fleet beyond the year 2000. The modernization includes new fiberglass rotor blades, tranmission and drive systems, modularized hydraulics, electrical systems, advanced flight controls, triple hook cargo system, and an auxiliary power unit. These features greatly enhance reliability, maintainability, productivity, survivability, and safety of the medium-lift fleet.

CHARACTERISTICS:

Max Gross Weight:	50,000 lbs
Cruise Speed:	162 knots
Endurance:	2.2 hours
Maximum Range:	300 nautical miles
Crew:	2 pilots, 1 crew chief
Armament:	Not Applicable
Payload:	15,873 lbs (or 33 troops) @ 4000 ft, 95 degrees F

SOVIET COUNTERPART:

The Soviets have one helicopter in the medium-life category, the upgarded "HIP". It is not considered equal in performance or efficiency to the improved Chinook. They do, however, have the HOOK and HALO heavy lift helicopters.

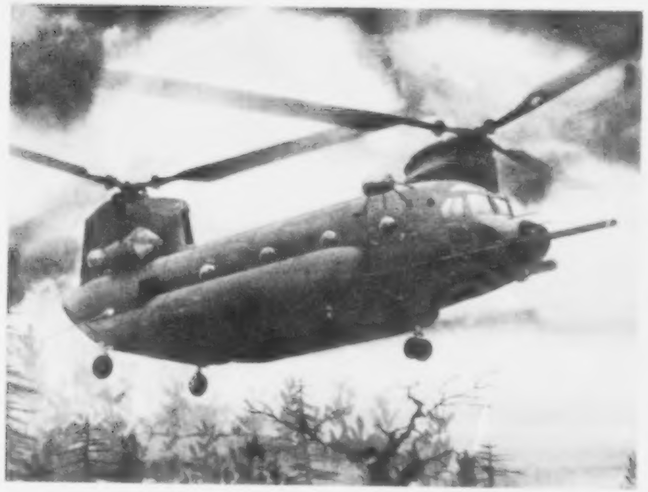
PROGRAM STATUS:

Planned productoin has been raised from 328 to 472 which will complete the modernization of the fleet to the "D" model configuration. Aircraft deliveries are on schedule. The program has been on cost since its inception. The Initial Operational Capability (IOC) date was attained in February 1984.

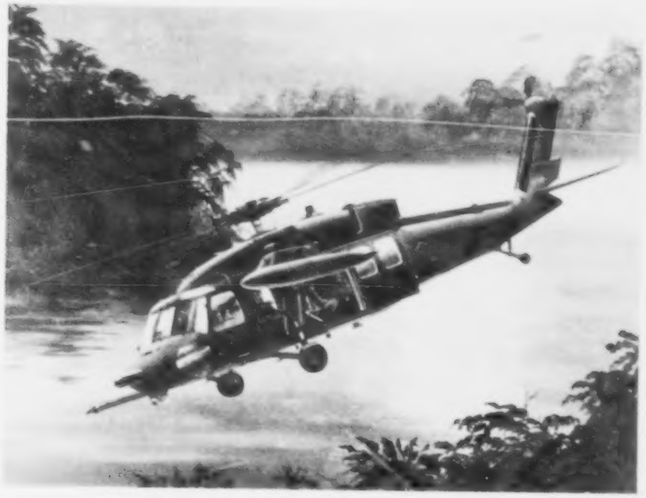
CONTRACTORS:

Boeing Vertol (Philadelphia, PA)
AVCO-Lycoming (Stratford, CT)

SPECIAL OPERATIONS AIRCRAFT (SOA)



MH-47E



MH-60K

Special Operations Aircraft (SOA)

MISSION:

The Special Operations Aircraft (SOA) are modified Black Hawk (UH-60L) and medium-lift Chinook (CH-47D) helicopters that will provide the Army with the capability for low level, night, adverse weather, extended range, precision navigation through unfamiliar mountainous terrain. Both the utility and medium-lift version (designated MH-60K and MH-47E, respectively) will be provisioned with extended range fuel systems including an aerial refueling capability, upgraded engines and worldwide communications equipment. Additional improvements include a totally integrated cockpit, which dramatically reduces pilot workload, as well as improved terrain following/terrain avoidance radar and forward looking infrared radar capability. Their missions cover rapid deployment, strategic intelligence strikes, and other operational missions supported by the Special Operations Forces.

CHARACTERISTICS:

	MH-47E	MH-60K
Mission Weight	54,000 lbs	24,500 lbs
Maximum Cruise Speed:	160 knots	140 knots
Endurance*:	9.8 hours	7.6 hours
Maximum Self Deployment Range*:	1260 nautical miles	755 nautical miles
Crew:	4	4
Armament:	2 - 50 calibre machine guns	2 - 50 calibre machine guns
Payload:	44 troops	12 troops

*Unrefueled w/30 min reserve; however, also has air-to-air refuel capability.

SOVIET COUNTERPART:

The Soviet MI-8 is a medium-lift helicopter and the MI-26 is a heavy lift helicopter. The HIP series and HALO performs troop carrier and general cargo transport.

PROGRAM STATUS:

The MH-47E and MH-60K are currently under development. MH-47E production is anticipated to begin in FY91 with First Unit Equipped (FUE) date during the 4QFY92; for MH-60K 4QFY92. The SOA program will provide 23 MH-60K and 26 MH-47E aircraft.

CONTRACTORS:

Boeing Helicopter Company (Philadelphia, PA)
Sikorsky Aircraft Division (Stratford, CT)
IBM/BENDIX (Oswego, NY)

SMOKE AND OBSCURANTS

INITIAL BURST OF M76
IR GRENADES

SMOKE FORMED FROM LARGE
AREA SMOKE SCREENING

XM55 PRODUCING IR SMOKE
ON M998 HMMWV

M825 WHITE PHOSPHORUS
SMOKE PROJECTILE

Smoke and Obscurants

MISSION:

Smoke and obscurants greatly improve survivability on today's high intensity battlefield. Smoke grenades deployed from combat vehicles produce an instantaneous screen that defeats enemy electro-optic sensors and weapon guidance systems. Artillery, mortar and rocket delivered smoke rounds can be directed on enemy units or between friendly and enemy positions to degrade enemy vision or to screen the advance of friendly forces. Moutned on tactical and combat vehicles, large area screening-smoke systems help obscure high priority targets (airfields, bridges and ammunition depots) as well as convoys and troop movements. Smoke projectiles, mortars, grenades and rockets are used for signaling and marking. Phosphorus munitions provide ancillary incendiary effects.

SOVIET COUNTERPART:

Soviet doctrine emphasizes extensive use of smoke during tactical operations. They achieved remarkable success in reducing personnel and materiel losses with smoke tactics in World War II. The Soviet intention to employ smoke against NATO forces is clearly demonstrated by the level of smoke usage in Warsaw Pact exercises. They have extensive capability to produce visual smokes. Indications suggest that the Soviets are expanding their obscurant capability to other eletromagnetic spectra.

PROGRAM STATUS:

Smoke and obscurants include a family of currently fielded smoke grenade launchers providing self-protection to armored vehicles. These systems degrade electro-optical devices such as day and night sights, anti-tank guided missiles, and laser range finders. Expanded capabilities are required to screen the infrared and millimeter regions of the electro-magnetic spectrum in order to defeat advanced target and guidance systems. An infrared defeating smoke grenade (M76) is in production, and a millimeter/infrared screening grenade (XM81) is in development. In addition, the multisalvo smoke grenade launcher program to enhance armored combat vehicle survivability includes a discharger, grenade, smoke, countermeasures (XM6), which is now in development. It will provide the capability to launch a variety of multispectral smoke grenades more than once without reloading. Projected smoke systems are being improved by changing from bulk-filled to submunition designs. The new design yields a several fold improvement in obscuration effectiveness for the same quantity of munitions. The XM264, 2.75-inch smoke rocket warhead is currently being developed to provide projected screening capabilities. M825 155mm smoke projectile and M819 81mm smoke mortar cartridge are examples of the submunition concept. Large area, visual screening capability has been improved through recently fielded mobile smoke generators mounted on M113s and HMMWVs (M1059 and M157, respectively). Development is underway on Large Area Screening Systems (LASS) with visual, infrared, and millimeter wave screening capabilities (XM56) mounted on HMMWVs. The Large Area/Mobile Projected Smoke System (LA/MPSS) mounts a variant of the XM56 Smoke Generator System on a medium chassis. Additionally, a smoke projector system, possibly a variant of the Hydra 70 rocket system, will be mounted on the LAMPSS medium chassis and HMMWV (LAMPSS light variant) to augment insufficient mortar and artillery projected smoke. Projected smoke/obscurant will provide visual, infrared and millimeter wave screening capabilities. The XM722, 60mm mortar cartridge is an example of signaling and marking smoke round.

CONTRACTORS:

MRC Division of Chamberlain Manufacturing Corp (XM56 Full Scale Development) (Hunt Park, MD)
Minowitz Manufacturing Corp (M157 production) (Detroit, MI) (Completed)
Tierney (Turbines for XM56 development) (Detroit, MI)
Brunswick Defense (Deland, FL) (XM6)
BEI Corporation (Eulers, TX) (XM264)

Nuclear, Biological, Chemical Reconnaissance System (NBCRS) - M93 Fox

MISSION:

The M93 is a wheeled armored vehicle equipped with a fully integrated NBC detection, warning and communication system. It will detect, identify and mark areas of NBC contamination, collect soil, water and vegetation samples for later analysis; mark areas of nuclear and chemical contamination; and transmit NBC information to unit commanders in the area of operation. The hazards to the NBCRS crew will be minimized through the inclusion of vehilce NBC collective protection providing overpressure with heating and cooling for crewmen.

CHARACTERISTICS:

Body Style:	6 wheel, armored-collective protection
Engine:	V8 Diesel - 320 HP
Weight:	18.7 ton
Speed:	65 mph
Range:	500 miles
Crew:	4 soldiers (3 soldiers - system improvement vehicle)

THREAT COUNTERPART:

BRDM-ZRKH, MTLB, RKHM, UAZ-469RKH ("x-Warsaw Pact")
Chinese also have NBC Recon System (no nomenclature available)

PROGRAM STATUS:

The NBCRS is a new non-developmental item (NDI) program consisting of four phases: (1) Proposal Evaluation and Shoot-off Phase during which proposals were evaluted and competition conducted and a winner selected; (2) Interim System Production Phase which provides 48 contractor supported (FY90-8, FY91-15, FY92-25) interim systems for urgent fielding to CENTCOM; (3) A System Improvement Phase to design, fabricate and test the NBCRS that will satisfy all ROC requirements; (4) Full Rate Production Pahse to produce the improved NBCRS for world wide fielding. As a result of Operation DESERT STORM, the German government donated 60 German NBCRS to the United States Government. Fifty systems are fielded with the Army forces and 10 with the Marine Corps on Operation DESERT STORM.

CONTRACTORS:

General Dynamics Land Systems (GDLS) (Detroit, MI)
Thyssen Henschel of the Federal Republic of Germany

The Combat Service Support mission area relates to providing tactical commanders with supply, maintenance, personnel and administration, civil affairs, medical, transportation, and other services. In terms of equipment modernization of the force, this handbook includes those major items that the Army is developing to improve its tactical transportation capability.

COMBAT SERVICE SUPPORT

Truck, 5 Ton, 6x6 (M939A2)

MISSION:

The 5-ton truck is a diesel-powered, 6-wheel drive tactical vehicle. The M939 series is improved over the old M809 series with new commercial components such as engine, transmission and brakes. It comes in six body styles: cargo, dump, tractor, wrecker, van and long wheelbase cargo. The FY85-90 multiyear procurement provides M939A2 series trucks which include a new lightweight, fuel efficient engine and central tire inflation system (CTIS) for improved mobility. The 5-ton trucks meet the requirement for general cargo transport, unit mobility and special purpose use. It supports fielding of many other systems such as Patriot, DEPMEDS, Apache, and MLRS.

CHARACTERISTICS:

Six body styles

Payload:	5 ton
Speed (mph highway):	52
Engine:	Diesel
Horsepower:	240
Drive:	6x6

SOVIET COUNTERPART:

URAL 375

Payload:	4.5 ton
Speed:	47
Engine:	Gasoline
Horsepower:	175
Drive:	6x6

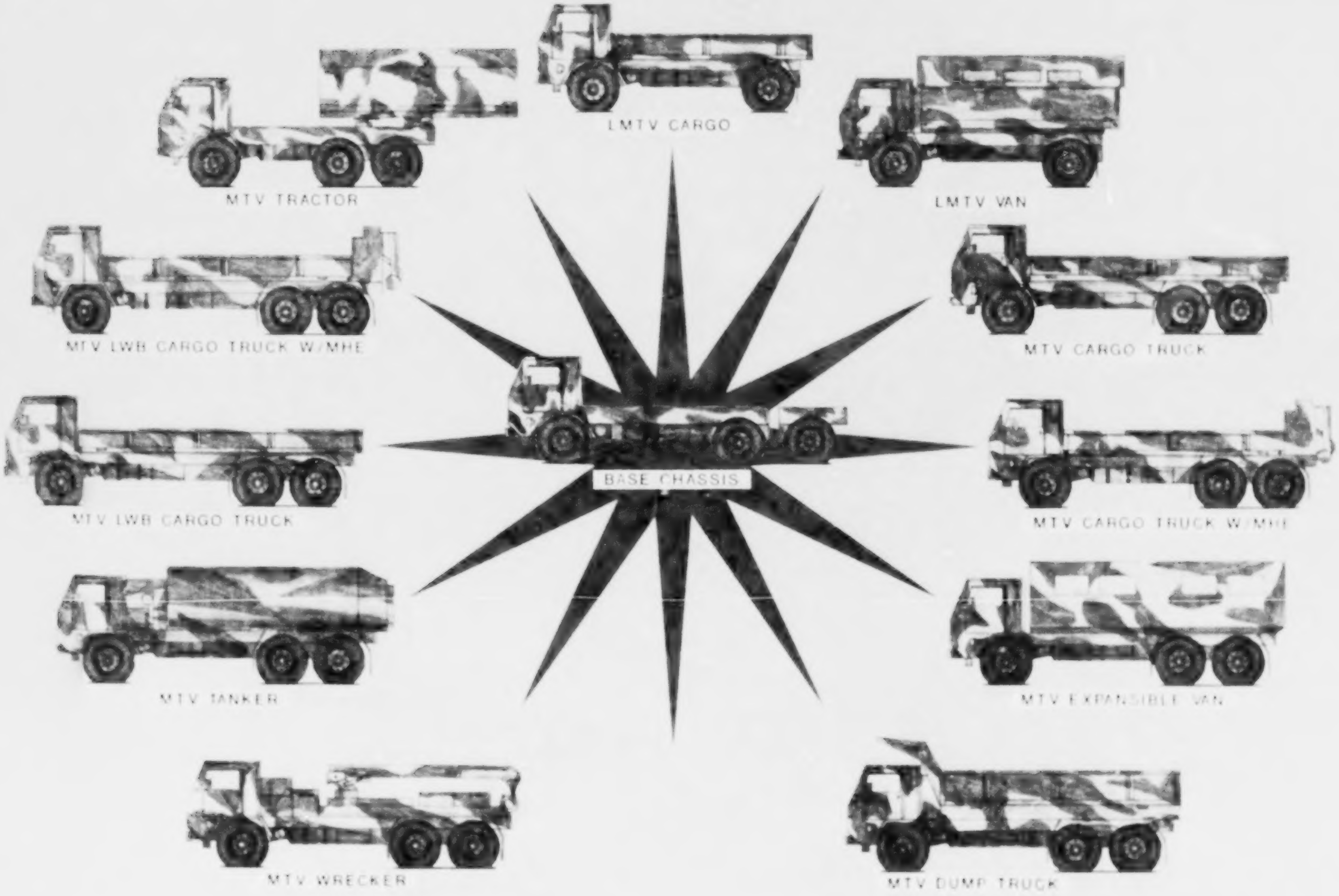
PROGRAM STATUS:

The first production contract was awarded in FY85. FY89 was the fourth year of the multiyear contract, the fifth year of the MYP was cancelled.

CONTRACTOR:

BMY (York, PA) (Production facilities located in Marysville, OH)

FAMILY OF MEDIUM TACTICAL VEHICLES (FMTV)


LMTV CARGO
MTV TRACTOR
LMTV VAN
MTV LWB CARGO TRUCK W/MHE
MTV CARGO TRUCK
BASE CHASSIS
MTV LWB CARGO TRUCK
MTV CARGO TRUCK W/MHE
MTV TANKER
MTV EXPANSIBLE VAN
MTV WRECKER
MTV DUMP TRUCK

Family of Medium Tactical Vehicles (FMTV)

MISSION:

The FMTV consists of a family of vehilces based on a common truck chassis defined by payload. The Light Medium Tactical Vehicle (LMTV) has a 2 1/2 ton payload capacity consisting of cargo and van body model variants, including a companion 2 1/2 ton full cargo trailer. The Medium Tactical Vehicle (MTV) has a 5-ton payload capacity consisting of the following models: cargo with and without material handling equipment (MHE), long wheel base cargo (with and without MHE), tractor, wrecker, dump, expansible van and tanker, including a companion 5-ton full cargo trailer. The FMTV will perform line haul, local haul, unit mobility, unit resupply and other missions in combat, combat support, and combat service support units. Vehicles will operate worldwide on primary and secondary roads and trails. The FMTV will supplement and replace existing and aging 2 1/2 ton trucks and 5-ton trucks.

CHARACTERISTICS:

	LMTV Cargo	MTV Cargo
Payload, lbs:	5000	10000
Towed load, lbs:	7500	21000
Cargo bed length, inches	147	168
Engine Type:	Diesel	Diesel
Transmission:	Automatic	Automatic
Drive:	4x4	6x6
Range, integral fuel at Gross Combined Weight:	300 miles	300 miles

SOVIET COUNTERPARTS: LMTV Track - ZIL-131, GAZ-66, ZIL-157; MTV Truck - URAL 375

PROGRAM STATUS:

Three contracts to provide prototype vehicles for competitive evaluation and testing were awarded in 1988. The results of testing and evaluation will support the production source selection. Milestone III production decision and award are scheduled for mid-1991.

CONTRACTORS:

Contractors for the prototype phase are:

- Tactical Truck Corporation (Livonia, MI)
- Stewart/Stevenson Services (Houston, TX)
- Teledyne (Muskegon, MI)

The production contractor will be selected from the three prototype contractors.

43

Heavy Expanded Mobility Tactical Truck (HEMTT)

MISSION:

HEMTT vehicles perform a variety of missions of varying duration. Current tactical doctrine states that support for combat elements should occur as far forward as possible. HEMTT vehicles are used for resupply, refueling, and recovery operation. MLRS units use the M985 HEMTT cargo for wheeled ammunition resupply between the Self-Propelled Launcher Loaders (SPLL) and Ammunition Supply Points (ASP). Self-Propelled artillery units use the M977 for resupply of ammunition between the Field Artillery Ammunition Support Vehicle (FAASV) and the ASP due to the requirement for FAASV to remain with the firing units. Armor and cavalry units use the M977 HEMTT cargo for continuous ammunition resupply to the Armored Forward Area Rearm Vehicle (AFARV). The AFARV will then move forward to rearm tanks and fighting vehicles. Vehicles refueling in the combat area must be accomplished as far forward as possible using the M978 HEMTT tanker to move POL forward from battalion trains to preselected areas close to the Forward Line of Troops (FLOT) where combat vehicles will withdraw to refuel. High mobility and high load capacity of the HEMTT are required to successfully perform this mission. The M984E1 wreckers used in the recovery role for other HEMTTs or other tactical vehicles were mobility, load, capacity lift, and winch capability of HEMTT is required to recover vehicles in the forward battle areas. The M983 HEMTT tractor will function as a support vehicle for Patriot Missile System and Pershing. The HEMTT Family is assigned to Army Armor, Field Artillery, Engineer, Missile, Air Defense Artillery, Aviation and Cavalry units worldwide.

CHARACTERISTICS:

Five body styles with common chassis	Transport C-130	
Payload:	10 ton	445 BHP
Speed (MPH highway):	55	60% Grade at GVWR
Engine:	Diesel	30% Side slope
Horsepower:	445	Fully automatic transmission
Drive:	8x8	43 Approach/45 Depart engines
Width:	96 in	Cab/Forward
Ground clearance:	13 in	Super single radial tires
Fording depth:	48 in	Traction transfer differentials (both rear axles)
Material Handling equipment		

SOVIET COUNTERPART:

	KRAZ 225B	ZIL-135	MAZ-7310
Payload:	7 1/2 ton	8-10 ton	16 ton
Speed (MPH highway):	70	40	40
Engine:	Diesel	Gas	Diesel
Horsepower:	240	300	520
Drive:	6x6	8x8	8x8

PROGRAM STATUS:

The HEMTT is a Nondevelopmental Item (NDI) program. The first contract was awarded in 1981 and the second in 1986. A total of 12,206 HEMTTs have been purchased with 11,506 delivered and 10,000+ fielded. The HEMTT is currently in production.

CONTRACTOR:

Oshkosh Truck Company (Oshkosh, WI)

Heavy Equipment Transporter System (HETS)

MISSION:

The HETS consists of the M1070 Truck Tractor and M1000 Semitrailer, 70 ton. Each is being procured under separate acquisition programs. The HETS is required to transport, deploy and evacuate the M1 Series Main Battle Tank (MBT) and other tracked vehicles on highway, unimproved roads and cross-country. Current HETS (M746/M911 with M747) demonstrates very poor durability when overloaded beyond 60 tons. HETS will transport 70 ton payloads, primarily M1 series tanks. Operates on OCONUS highways; on CONUS highways with permits. Interoperable with current HETS and German HET system. Pass under four meter underpass when loaded with M1 series tank. Military load classification (MLC) of 95 or less. Negotiates 90 degree intersection of two 30 foot highways.

CHARACTERISTICS:

Speed:	40-45 mph	With 70 ton payload:	25-30 mph
Range:	300 miles		
Transport:	C-5 aircraft		
Mobility:	95% on road	5% off-road	
RAM:	3,000 MMBHMF for both tractor and trailer		

PROGRAM STATUS:

The HETS is a Nondevelopment Item (NDI) program. Two separate programs; one for trailer and one for tractor. Trailer procurement to lead tractor procurement by five to six months. Trailers will be fielded for use with current HET tractors (M746/M922), follow-up with new tractor 11-12 months later. Trailer and tractor to be fielded separately.

CONTRACTORS:

In-House:	PEO, Combat Support TACOM (Warren, MI)
Contractor:	Oshkosh (Oshkosh, WI) (Tractor) Southwest Mobile Systems (St. Louis, MO) (Trailer)

Palletized Load System (PLS)

MISSION:

The Palletized Load System (PLS) is a 16.5 ton tactical vehicle composed of a prime mover with integral self-load/unload capability, a 16.5 ton trailer, and flatracks (demountable cargo beds). Vehicles can also be equipped with materiel handling equipment and/or winch. The PLS will perform line haul, local haul, unit resupply, and other missions in the support of modernized, highly mobile organizations. The PLS prime movers with associated trailers will selectively replace or augment the standard tactical vehicles currently authorized in units such as Field Artillery and Transportation. Interoperability of flatracks with the equipment of European forces is a requirement.

CHARACTERISTICS:

Truck payload, tons:	16.5
Trailer payload, tons:	16.5
Flatrack dimensions, feet:	8x20
Engine Type:	Diesel
Tranmission:	Automatic
Number of Driven Wheels:	10
Range, integral fuel at Gross Combined Weight:	255 miles

SOVIET COUNTERPART:

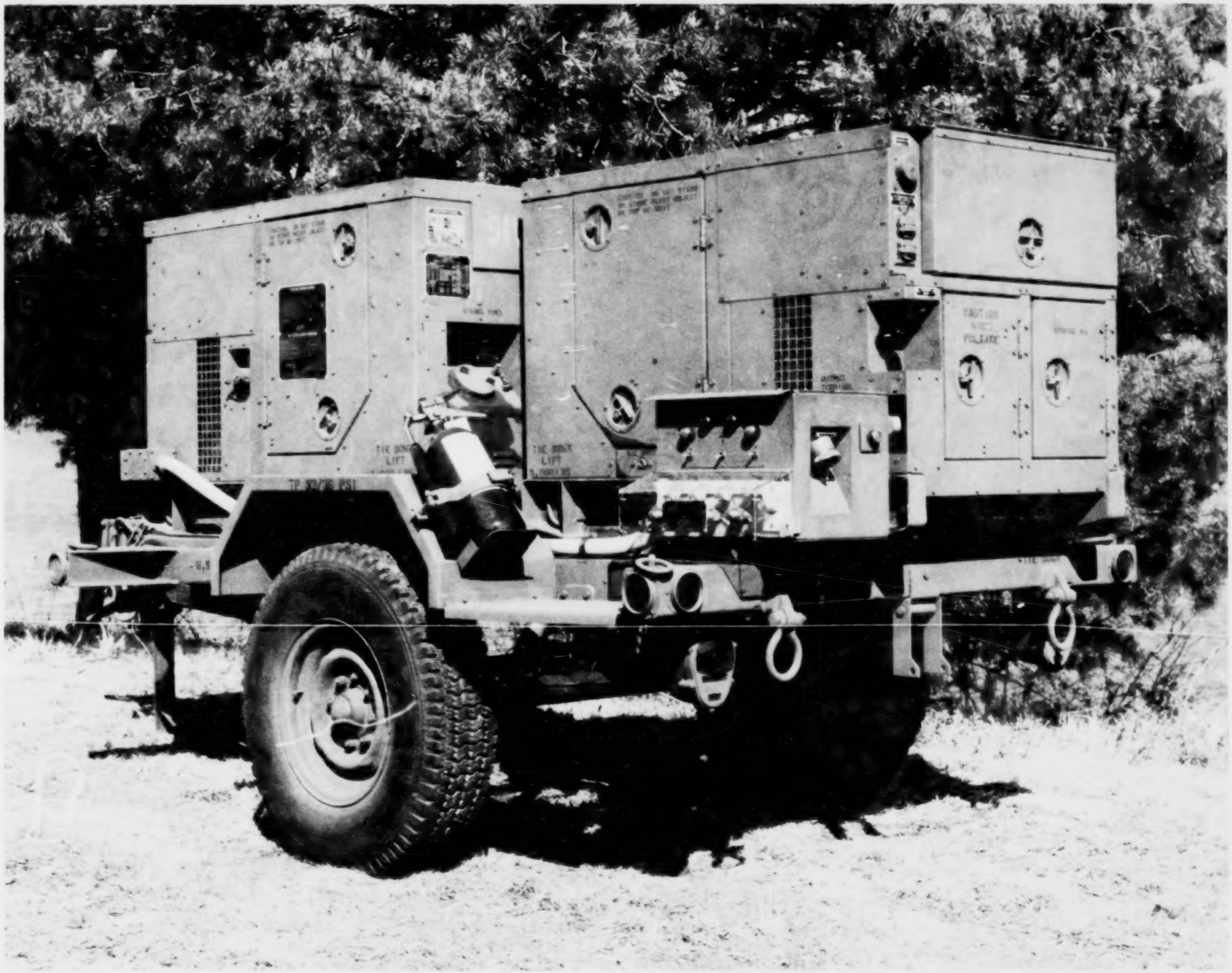
No known Soviet counterpart.

PROGRAM STATUS:

PLS is a Nondevelopmental Item (NDI) program. The program was approved by the Defense Acquisition Board (DAB) to enter low rate initial production (LRIP), the contract was signed in September 1990, and LRIP begins September 1991.

CONTRACTOR:

In-House:	PEO, Combat Support TACOM (Warren, MI)
Contractor:	Oshkosh (Oshkosh, WI)


TIE DOWN
LIFT
TIE DOWN
LIFT
CAUTION
HIGH
VOLTAGE
OUTPUT
TERMINAL
U.S

Tactical Quiet Generators (TQG)

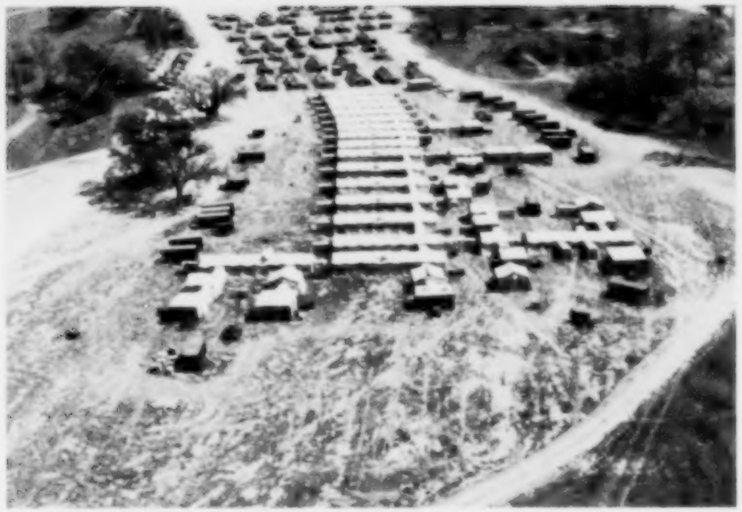
MISSION: The Tactical Quiet Generator (TQG) Set is the new DOD standard family of power sources that meets the users current and future requirements. The new 3KW-200KW TQG provides DOD with more reliable, quiter, lighter weight, single fuel, and improved High-Altitude Electromagnetic Pulse (HAEMP) protected electrical power systems for comman post, C3I systems, weapon systems, logistics and maintenance functions and other battlefield support equipment. The new power generators will counter threat forces which have the capability of locating critical targets by detecting the high aural and thermal signatures.

CHARACTERISTICS:

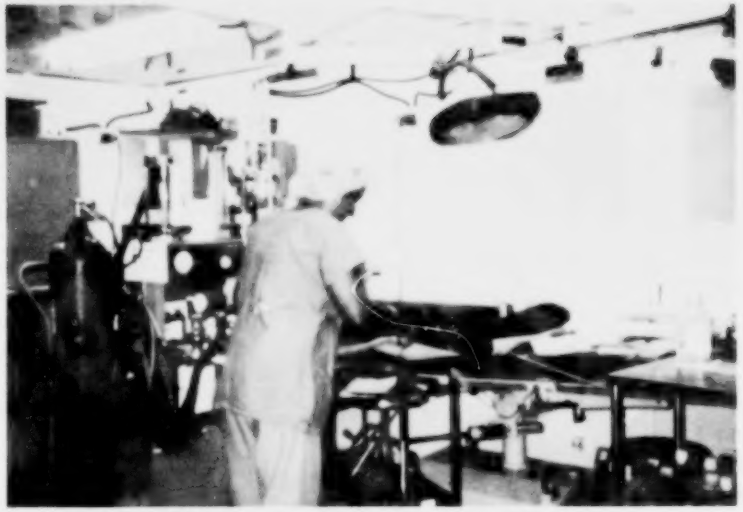
	Current Fleet Performance	TQG Requirements
Aural Signature:	79-85 dBA @25M	70dBA @7M
Fuel:	GAS/DSL/JP4	JP8/DSL
Environment:	All Climatic Conditions	3 of 4 Climatic Conditions
KW:	1.5-200	3-100
Hertz:	DC/50/60/400	60, 50/60, 400
HAEMP:	No	Yes
IR Suppressed:	W/Nets	W/Nets
Reliability (MTBOMF)	140-408 hrs	500/600 hrs
Standard Voltage Connections:	Yes	Yes
Slave Receptacle:	Ordnance	NATO

PROGRAM STATUS: TQG contract award for 5kw-60w TQG sets was made in August 1988. During April 1989 a contract was awarded for the 3kw TQG. The First United Equipped (FUE) for the TQG sets is scheduled for 3QFY92.

DEPMEDS

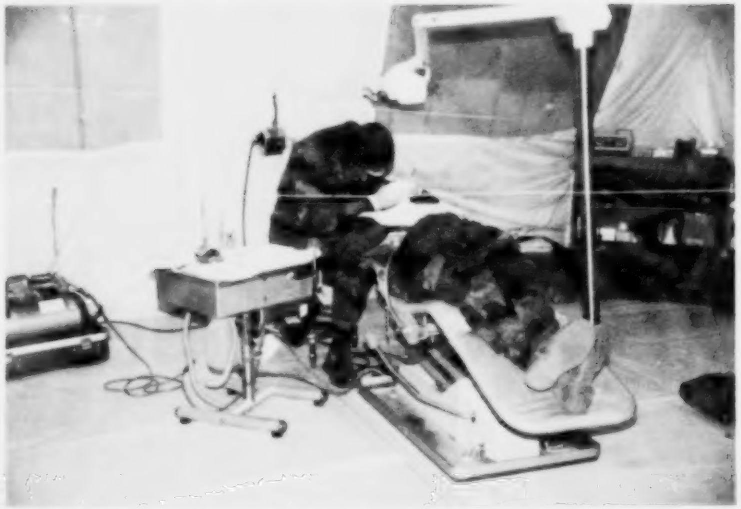


400 BED EVACUATION HOSPITAL DEPLOYED IN A FIELD ENVIRONMENT



OPERATING ROOM INSIDE INTERNATIONAL STANDARDS ORGANIZATION (ISO) RIGID WALLED SHELTER

X-RAY INSIDE ISO SHELTER



DENTAL PROCEDURE BEING PERFORMED INSIDE A TWO SECTION TENT, EXTENDABLE, MODULAR, PERSONNEL (TEMPER)

Deployable Medical Systems (DEPMEDS)

MISSION:

The DEPMEDS family of equipment is DOD approved equipment packaged into standardized modules for use by all services to equip their theater of operations deployable hospitals. There are seven types of Army hospitals, ranging from foward deployed (MASH (Mobile Army Surgical Hospital) units in the combat zone to general hospitals in the Communications Zone (COMMZ). Each is composed of different configurations of standard modules such as operating rooms, laboratories, X-ray units and wards. The DEPMEDS hospital sets standardize the use of the latest medical technology and equipment, expendable supplies, and major non-medical support equipment {power units, TEMPER (Tent Extendable Modular Personnel) tents, tactical shelters, and heating and air contitioning] throughout the Department of Defense. Standard modules improve medical unit mobility and patient distribution densities. The hospital sets can be deployed under all climatic conditions. The fielding of the 129 Army hospital sets will eliminate serious shortages of field medical equipment and achieve major advances in equipping the Total Army. Gaining units will receive their DEPMEDS equipment in one package under the Total Package Fielding concept. This is the largest Total Package Fielding effort ever undertaken by the Army Medical Department.

CHARACTERISTICS:

System characteristics vary by type of hospital set. All meet the systems criteria of providing adequate but austere care, being affordable, maintainable, relocatable, having modular configuration and quad-service compatibility, and being transportable by strategic air.

SOVIET COUNTERPART:

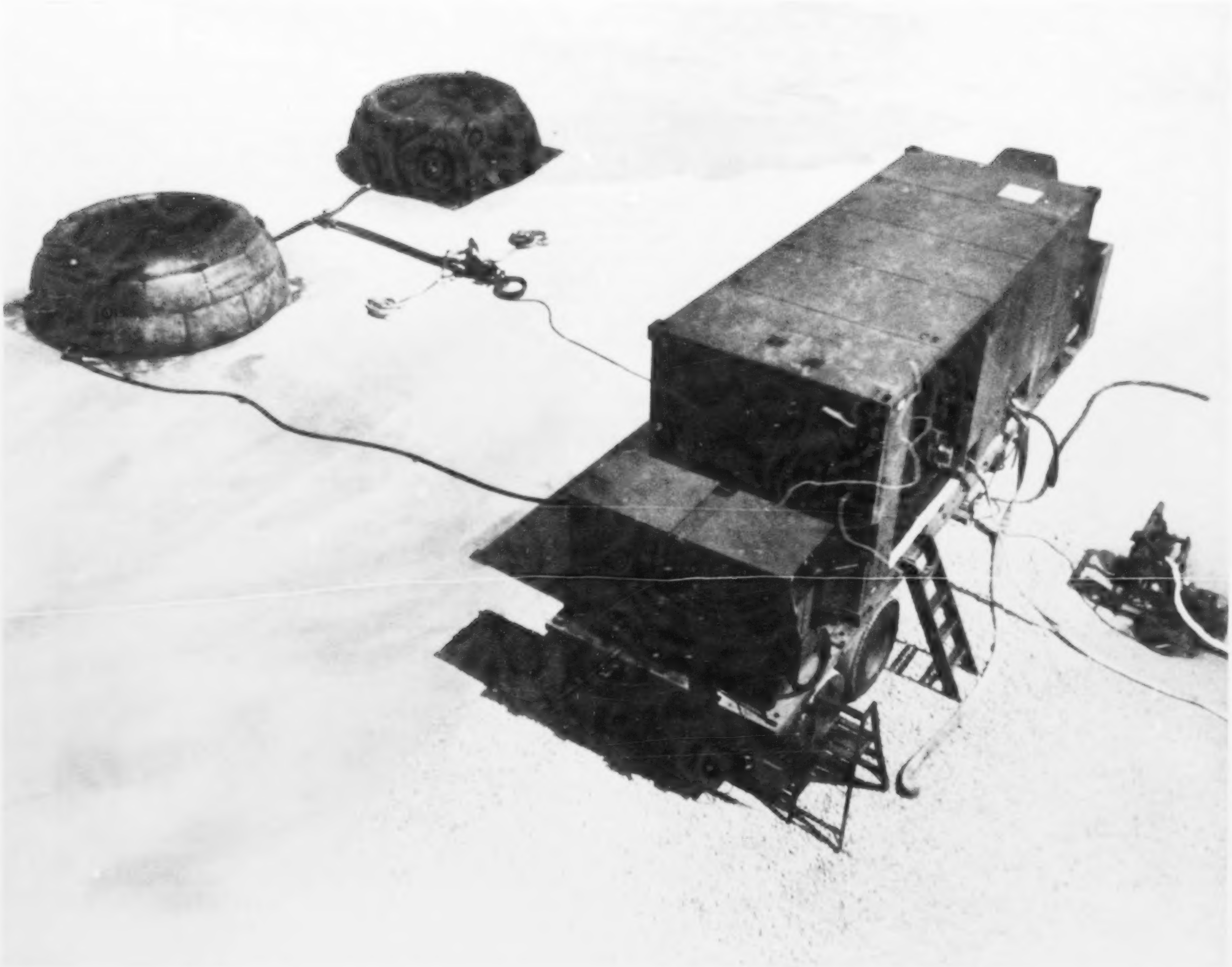
There is no know Soviet counterpart to DEPMEDS.

PROGRAM STATUS:

The DoD Medical Standardization Board insures compatibility among the Services. The Army program is managed by the DEPMEDS Project Manager, operating under the authority of the Secretary of the Army. DEPMEDS hospital sets are being procured and fielding began in the 4QFY87. By the end of FY90, 56 hospital sets had been fielded to Army combat hospital units.

CONTRACTORS:

A large number of contractors are involved in providng the 3,400 plus medical and non-medical components of DEPMEDS. These components are assembled into modules and hospital sets by the Defense Logistics Agency, Defense Depot, Ogden, Utah.



Reverse Osmosis Water Purification Unit (ROWPU)
3000 Gallons Per Hour (GPH)

MISSION: The 3000 GPH Reverse Osmosis Water Purification Unit (ROWPU) provides fresh drinking water worldwide. The ROWPU purifies fresh, saline, brackish, and nuclear, biological, and chemical (NBC) contaminated water.

CHARACTERISTICS: The 3000 GPH ROWPU represents state-of-the-art technology in water purification equipment. The unit consists of a raw water subsystem, clarification sybsystem, reverse osmosis (RO) subsystem, NBC post treatment subsystem, chemical feed subsystem, process control station, piping, fittings, and a storage area for pumps and operating supplies. The chemical feed, clarification, RO, and NBC post treatment subsystems, along with the process control station, is enclosed in a 8 foot wide by 8 foot high by 20 foot long ISO container. Support system components of the system include collapsible water storage tanks, hoses, chemicals, tools, distribution and raw water pumps, a 60KW generator set and a M871 semitrailer. This equipment is designed to operate 20 hours a day at a production rate equivalent to 3000 gallons per hour of fresh water and 2000 gallons per hour of sea water. The unit is transportable by two C-130s, one C-141, rail, ship, or standard military vehicles. The ROWPU replaces the erdlator which can purify only fresh water.

SOVIET COUNTERPART: The Soviets currently utilize two pieces of equipment to accomplish the task for which the United States has developed the ROWPU. To purify fresh water and NBC contaminated water, the Soviets currently use the MAFS-3, a unit similar to the erdlator. To purify brackish or saline water, the Soviets utilize distillation process equipment, called the OPS, incorporated into their current standard desalinization equipment.

PROGRAM STATUS: The initial production contract for the 3000 GPH ROWPU has been awarded. The follow-on contract will be fully competitive.

CONTRACTOR: Aqua Chem, Inc. (Milwaukee, WI)

NO SMOKING
TEST SET, CONTACT
AN/USM- (V)
VOL: 1.4CU FT WT: LBS
CASE 1 OF 2

Integrated Family of Test Equipment (IFTE)

MISSION:

The Integrated Family of Test Equipment (IFTE) supports weapon systems state-of-the-art technology electronics, ensuring combat readiness for the 1990's and beyond. It allows the isolation of weapon systems faults to the electronic Line Replaceable Units (LRUs) at Direct Support (DS) areas of quick turnaround and minimum spares pipeline, isolation of faults in Shop Replaceable Units (SRUs) at General Support (GS) areas and depots, and adapts to and accepts new weapon systems.

CHARACTERISTICS:

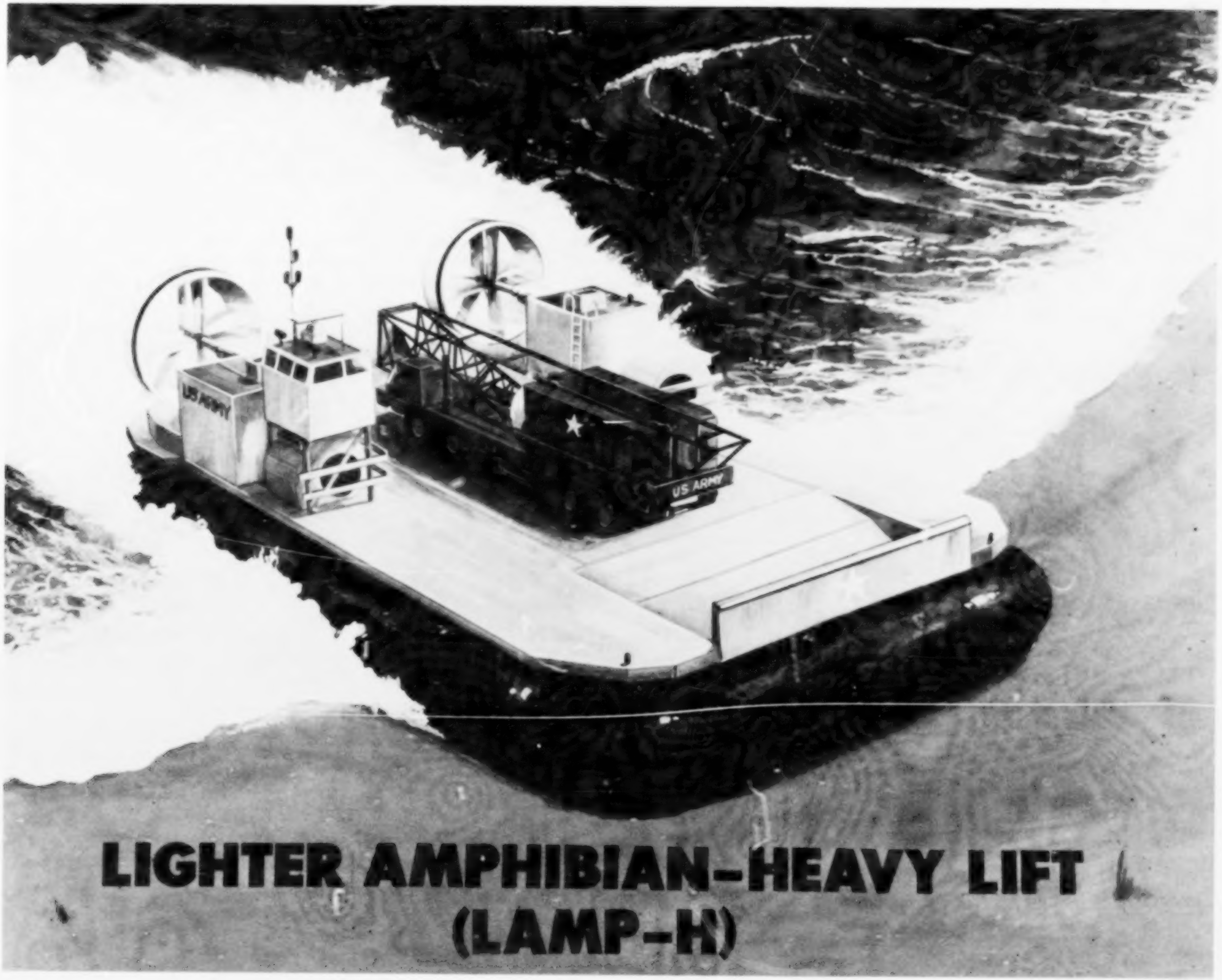
IFTE is a modular Test, Measurement, and Diagnostic Equipment (TMDE) system with standard architecture. The program consists of four interrelated systems that will provide a generic Automatic Test Equipment (ATE) capability through all levels of the Army maintenance structure. Two tactical systems of the IFTE Program, the Contact Test Set (CTS) and the Base Shop Test Facility (BSTF) will be capable of electronic ATE Support, and Electro-Optical (EO) capability will be fielded in FY94. The CTS is a man-portable ATE system that augments supported systems' BIT/BITE and isolates weapon systems failure to the appropriate LRUs. The BSTF consists of the Base Shop Test Station (BSTS), in a 5-ton truck mounted S-280 shelter, plus another 5-ton truck mounted S-280 shelter for Test Program Set (TPS) storage; powered by 50KW generator sets. It will be positioned at DS/GS levels to fault diagnose evacuated LRUs to the Shop Replaceable Unit (SRU) level. The effort applied to any item being tested by an ATE system is Unit Under Test (UUT). The TPS is the software program the Interface Connecting Device (ICD) to connect the UUT to the BSTS or CEE, and the documentation an operator uses to perform test operation on the UUT. The non-tactical IFTE systems are the Automatic Test Set Support Equipment (ATSE) and the Commercial Equivalent Equipment (CEE). ATSE is the software system that operates on a Sun workstation to develop approximately 70% of the software portion of the TPS. The CEE is a non-ruggedized equivalent of the BSTF that is used in a Special Repair Activity (SRA) and Depot. The CEE completes the TPS development that is started on the ATSE, and performs fault diagnosis/repair for depot level UUTs.

SOVIET COUNTERPART:

There is no known counterpart to the IFTE.

CONTRACTOR:

Grumman Aerospace Corp, Electronic Systems Division (Melville, NY)


US ARMY
US ARMY

LIGHTER AMPHIBIAN-HEAVY LIFT
(LAMP-H)

Lighter, Amphibian, Heavy Lift (LAMP-H)

MISSION: This Amphibian, Heavy Lift, Lighter will productively transport modern battlefield tanks and other heavy outsized items of equipment from ocean vessels anchored off-short, and deliver them over the beach in a Logistics-Over-the-Shore (LOTS) operation.

CHARACTERISTICS: The LAMP-H is an air cushion vehicle capable of the following: being maneuvered and moored alonside anchored vessel with on board crew without damaging either craft, interfacing with Roll-on/Roll-off vessel ramp discharge systems, transporting at least 100-tons of cargo over the water at a surface speed of 10-15 knots, operating at full cargo payload for 10 continuous hours without refueling, negotiating natural and man-made underwater obstacles and rocky or soft mud-like bottom conditions and will be able to transverse over those rises commonly found in beach environments to place cargo at desirable unloading sites, being transported on LASH vessels without disassembly. The LAMP-H will replace the Ligher Amphibious Resupply Cargo, 60 Ton (LARC-LX).

SOVIET COUNTERPART: The Soviets currently utilize at least six air cushion vehicles designed for different missions. They currently use the Lebed (NATO Code Name) class for amphibious assault landings and high-speed LOTS operations. The Lebed's cruising speed in calm conditions is 50 knots and the maximum payload is 35 tons.

PROGRAM STATUS: A request for proposals was released to the watercraft industry and contract award for the Engineering Development (ED) of the LAMP-H is expected in June 1991. ED prototype testing should begin in June 1993 and initial production is scheduled for 1996.

CONTRACTOR: To be determined.

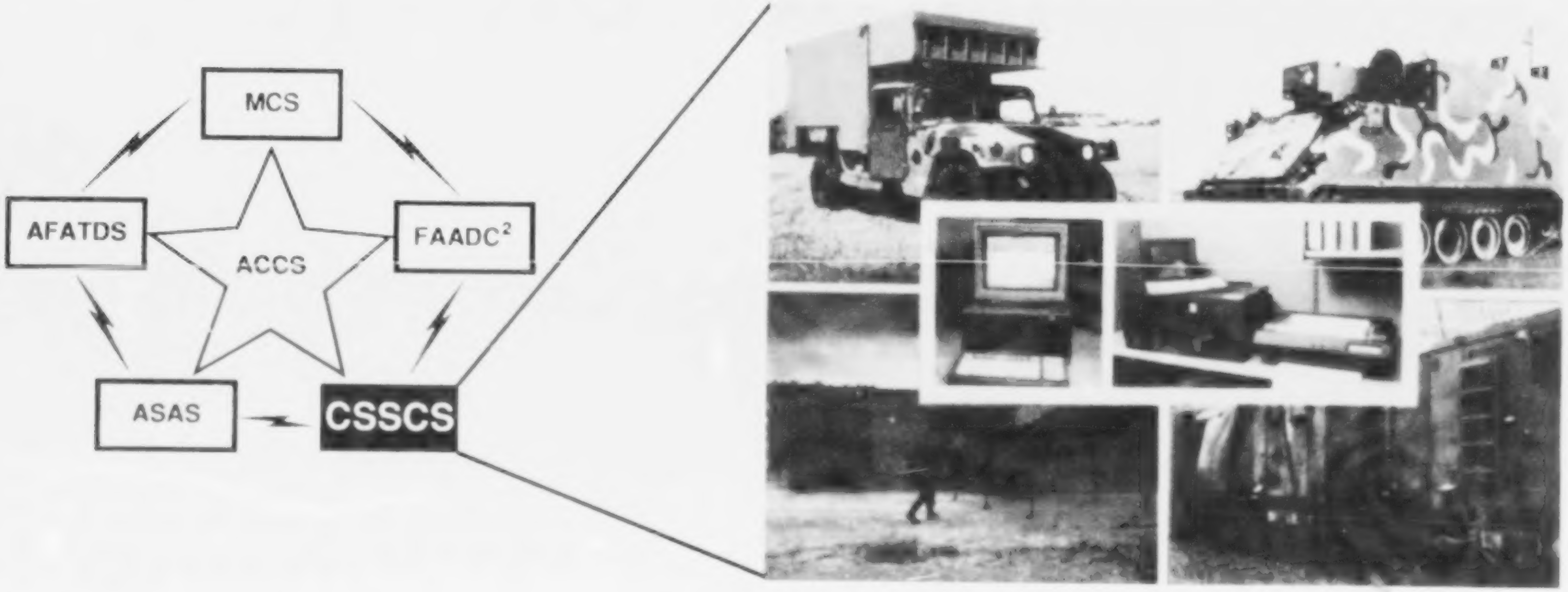
The Tactical Command, Control and Communications (C^3) mission area includes resources for providing effective command and control, automation, and communications support to combat units. In order for a commander to effectively control his tactical elements, he must know where they are located and must have a means by which to talk to them even in an enemy electronic countermeasure environment. The systems included in this mission area provide that capability. Without them, the Army would be as helpless as a person without a nervous system.

COMMAND, CONTROL, AND COMMUNICATIONS (C^3)

Combat Service Support

CSSCS

- Decision Support System for CSS CDR and staffs to provide timely and accurate
  - Unit Status
  - Sustainment Capability
  - Supportability Options
- CSSCS input to "common picture"
- Automated C^2 support for the CSS Commander


MCS
AFATDS
ACCS
FAADC²
ASAS
CSSCS

Combat Service Support Control System (CSSCS)

MISSION:

The Combat Service Support Control System (CSSCS) is a computer software system designed to assist the CSS commander and his staff to rapidly collect, store, analyze, and disseminate CSS information to support the functions of command, control and resource management. The CSS commanders and staff have always participated in the force level planning and decision-making processes through a manual effort of gathering, correlating, and analyzing volumes of technical data from the existing Standard Army Management Information Systems (STAMISs). The CSSCS implementation automates the CSS BFA node of the ATCCS. CSSCS can extract summary information from the CSS STAMISs, accept input from other elements of the CSS community, and provide the CSS commander and staff with an analysis tool to evaluate CSS information with respect to the force level commander's tactical courses of action. CSSCS also facilitates coordination with other BFA nodes. CSSCS will be organic to CSS units and headquarters staffs within the maneuver brigades, separate brigades, armored cavalry regiments, divisions, corps, and echelons above corps.

SOVIET COUNTERPART:

Unknown

PROGRAM STATUS:

The CSSCS development is structured to evolve over five versions. Version 1 was the subject of an experiment during 1QFY89 which baseline limited class I, III, and V capabilities and the processing architecture. Version 2 was demonstrated during 3QFY90 and provided critical information to the ASARCI/II program review. Version 2 established automated interfaces with selected CSS STAMIS and the MCS and provided initial division level CSS functional applications software on ATCCS CHS. In FY93, Version 3 will provide the Army an integrated ATCCS capability. Improvements and added capabilities for all echelons will continue in Versions 4 and 5. CSSCS successfully passed the ASARC I/II program review and was approved for full scale development. Initial development of the CSSCS software (Versions 1 and 2) was initiated in early 1988 by TRW under the MCS contract with PM OPTADS. This development effort is to be completed in early CY91. A RFP was put out in June 1990 for Versions 3 and 4 software with a contract expected to be signed in February 1991.

CONTRACTOR:

TRW (Redondo Beach, CA) (Versions 1 and 2)
TBD (Versions 3, 4, and 5)

Standardized Integrated Command Post System (SICPS)

MISSION:

The SICPS is a family of command post facilities developed to house the Army Tactical Command and Control System (ATCCS) across all battlefield functional areas. Variants of SICPS consist of a Tent Command Post (CP), a Rigid Wall Shelter CP, a Track Vehicle CP (M577 variant) and a 5-Ton Expando Van CP. These CP facilities will provide protected work areas for command and control functions at corps through battalion levels. SICPS will be fielded as components of the Maneuver Control System, the Forward Area Air Defense Command and Control System, the Advanced Field Artillery Tactical Data System, the All Source Analysis System and the Combat Service Support Control System.

CHARACTERISTICS:

Tent CP: 11 ft. x 11 ft. with interchangeable sidewalls, any of which can be removed for complexing two or more tents together; supported by a three-piece aluminum frame; fielded with two tables, two mapboards and a fluorescent lightset. The tent CP can be attached to any of the other SICPS variants by replacing one sidewall with an interface wall. The tent CP is part of the other three SICPS variants.

Rigid Wall Shelter CP: Mounts on the HMMWV shelter carrier and is integrated with a 5KW power unit, 9000 BTU/hr air conditioner, collective chemical/biological protection, C2 equipment racks, power and signal import/export panels, intercom and operator seats.

Track CP: Installation kit for existing M577 tracked CP vehicles to provide C2 equipment racks, power and signal import/export panels, operator seats, and provision for storage of the tent CP.

5-Ton Expando Van CP: Installation kit for existing vehicles to provide C2 equipment racks, power and signal import/export panels, and operator seats.

SOVIET COUNTERPART:

No known Soviet counterpart.

PROGRAM STATUS:

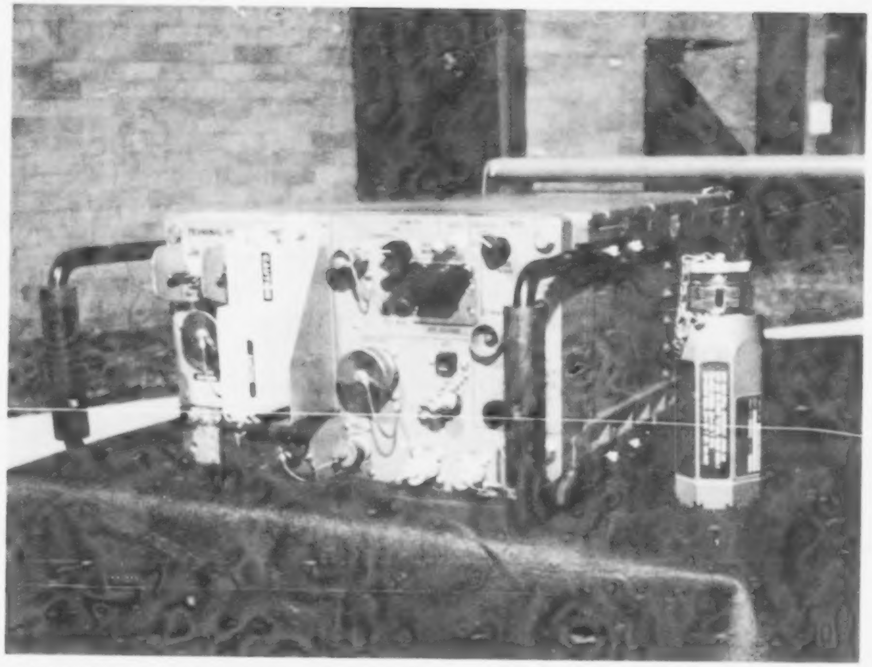
TENT CP: Type Classified (TC) Standard 8 Feb 90. Production contract awarded 31 Oct 90. RIGID WALL SHELTER CP: Technical Testing is ongoing; TC-Limited Procurement Urgent planned for Feb 91. TRACK CP: Full Scale Engineering Development Contract in place; TC-Limited Procurement Urgent planned for Dec 91. 5-TON CP: In development; Type Classification planned for Sep 91.

CONTRACTORS:

TENT CP: Camel Mft. Co. (Knoxville, TN)
RIGID WALL SHELTER CP: Brunswick Corp, Defense Div. (Marion, VA)
TRACK CP: FMC Corp (San Jose, CA)
5-TON CP: CECOM Engineering Support Activity (Ft. Monmouth, NJ)

ARMY DATA DISTRIBUTION SYSTEM (ADDS)

ENHANCED PLRS USER UNIT
(LOW SPEED DATA DISTRIBUTION)



JTIDS CLASS 2M TERMINAL
(HIGH SPEED DATA DISTRIBUTION)

Army Data Distribution System (ADDS)

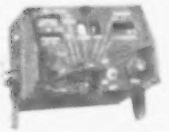
MISSION: The Army Data Distribution System (ADDS), formerly called the Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS Hybrid) will modify, combine, and integrate components of PLRS and JTIDS in an evolutionary five-phase program to take advantage of the advanced state of development of these two projects. The ADDS will support Army near real time data distribution requirements in the Division and Corps area. The ADDS contains three primary equipment elements: Enhanced PLRS User Units (EPUUs), JTIDS terminals, and Net Control Stations (NCSs). The EPUUs are assigned to almost all units in the Division area that participate in near real-time data communications, unit identification and position location/navigation. JTIDS terminals will be assigned to those users whose data throughput requirements exceed the capability of the EPUU and who particpate heavily in interservice communications. For example, air defense users pass high volume tracking data internally and exchange friendly identification information with the Air Force. The NCS provides overall system network management. The ADDS system will support data communications requirements in the five functional areas of fire support, air defense, intelligence/electronic warfare, maneuver control and combat service support. The FAAD C2I (Forward Area Air Defense Command, Control and Intelligence) System is heavily dependent on ADDS for data distribution.

SOVIET COUNTERPART: None known.

PROGRAM STATUS: ADDS entered its final phase of development in 1985. Initial pre-planned product improvement production began in January 1990.

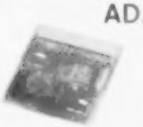
CONTRACTORS: Hughes Aircraft Company, Ground Systems Group (Fullerton, CA)
GEC-Marconi (Totowa, NJ)

SINCGARS COMBAT NET RADIO FAMILY



CONTROL
MONITOR/
IVRC

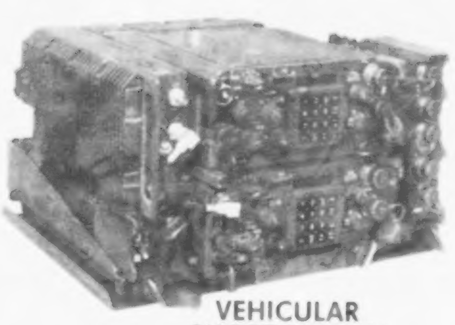
ECCM



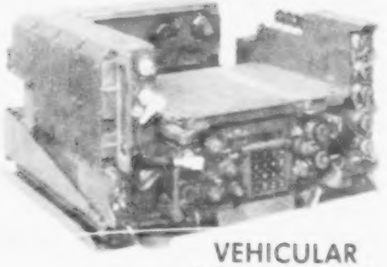
DATA RATE
ADAPTER

MANPACK
RADIO

RECEIVER/
TRANSMITTER



VEHICULAR
SHORT RANGE/
LONG RANGE
RADIO



VEHICULAR
LONG RANGE
RADIO

VEHICULAR
SHORT RANGE
RADIO

VEHICULAR
ANTENNA

Single Channel Ground and Airborne Radio System (SINCGARS-V)

MISSION:

SINCGARS provides commanders with a reliable, easily maintained Combat Net Radio (CNR) for command and control. SINCGARS provides effective Electronic Counter-Counter Measures (ECCM) against threat Electronic Warfare (EW). SINCGARS configurations include manpack, vehicular (both low and high power), and airborne models. The first radios fielded do not contain integrated communications security (COMSEC) but, instead, will use the external VINSON COMSEC device. COMSEC is integrated in currently produced versions of the ground and airborne models (ICOM SINCGARS). SINCGARS radios have greatly improved reliability over the AN/VRC-12 and AN/PRC-77 series radios which they replace, and they are exceeding the requirement of 1,250 hour Mean Time Between Failure (MTBF). An airborne version of the SINCGARS radio will replace the currently standard aircraft radios, the AN/ARC-114 and AN/ARC-113.

CHARACTERISTICS:

Weight:	22.5 lbs w/battery and COMSEC Device ICOM weight 19.6 lbs w/battery
Frequency Range:	30.00 to 87.975 MHz
Channels:	2320
Range:	8-35 km

SOVIET COUNTERPART:

The Soviets have no known counterpart.

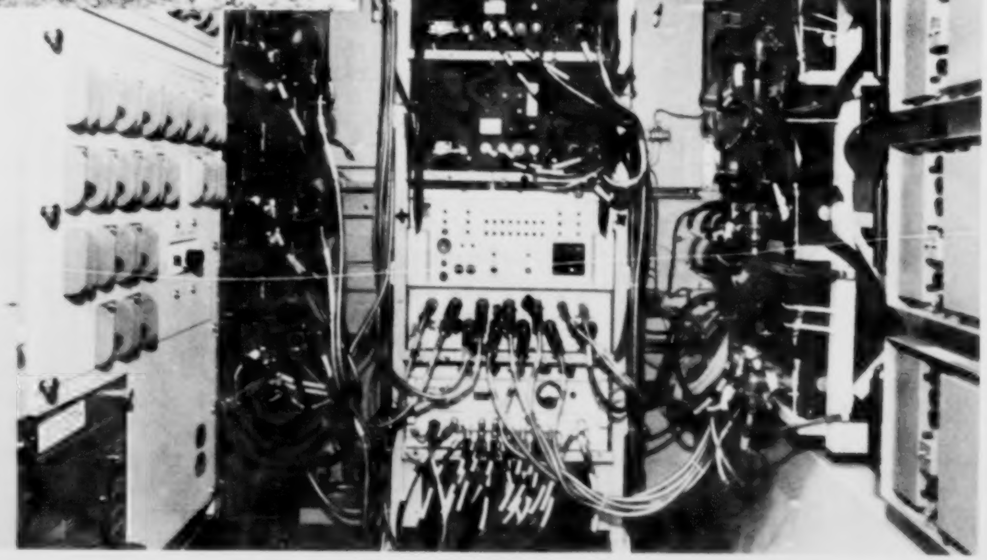
PROGRAM STATUS:

First source SINCGARS ground radios passed First Article Tests in January 1988 and production deliveries began immediately. A Follow-on Operational Test and Evaluation was successfully completed in May 1988 on the non-integrated COMSEC (non-ICON) version of the radio. An Intial Operational Test and Evaluation (IOTE) and Follow-on Operational Experiment were successfully completed on the ICOM radio in November 1990. Award for Option 3 for 16,000 radios was made in June 1989. Option 4 for 16,000 radios was awarded in1QFY91, completing the first source contract for 44,100 ground radios. Of this quantity, 27,625 will have integrated COMSEC (ICOM). All SINCGARS produced after FY90 will be ICOM SINCGARS. A second source of ICOM SINCGARS ground radios was selected and a firm fixed price contract was awarded in July 1988 with two options for FY91 and FY92. Full competition will begin in FY93. The 2d Infantry Division in Korea received 145 SINCGARS radios in December 1987, providing commanders with jam-resistant communications for their DMZ forces. Since then, the program office has fielded over 7,000 radios including the training base, and Army units in SOUTHCOM, WESTCOM and Korea. The SINCGARS airborne radio passed First Article Tests in September 1988. Option 3 was awarded in January 1991. Airborne radios will be fielded concurrently with the ground radios.

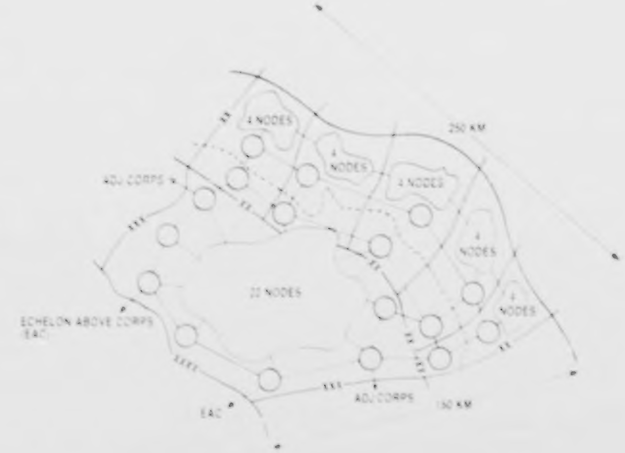
CONTRACTORS:

First Source (ground and airborne radios): ITT Aerospace/Optical Division (Fort Wayne, IN)
Second Source (ground radios): General Dynamics Electronics Systems (San Diego, CA)

HMMWV WITH S250 SHELTER



RADIO ACCESS UNIT (INSIDE SHELTER)


4 NODES
250 KM
ADJ CORPS
4 NODES
4 NODES
4 NODES
22 NODES
4 NODES
ECHELON ABOVE CORPS (EAC)
EAC
ADJ CORPS
150 KM

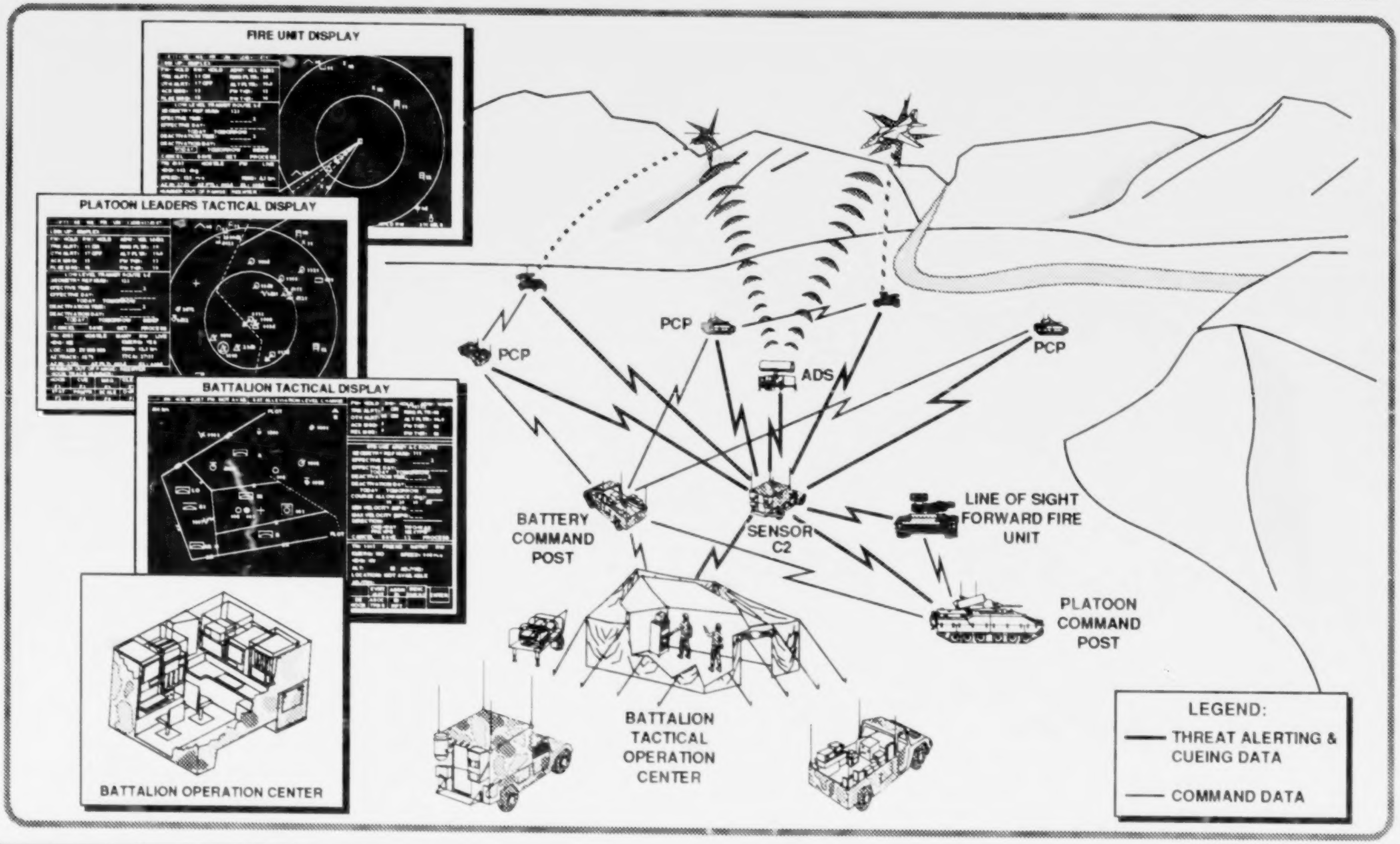
MSE Deployment - 42 nodes

- 4 nodes per division
- 22 nodes per corps

Mobile Subscriber Equipment (MSE) Program

MISSION:	The Mobile Subscriber Equipment (MSE) is an area communications system which is being fielded in the Corps and division areas. MSE provides secure static and mobile (on the move) voice/data/facsimile service to principal commanders and key staff officers enabling them to exercise command and control over their forces in the rapidly changing battlefield environment. (An approximate commercial equivalent is a telephone system with mobile radio telephone service and data capability.) The Corps network consists of five divisions which are composed of 42 nodes and will provide service to 1,900 mobile and 8,500 static subscribers. MSE is interoperable with TRI-TAC, combat net radios, commercial telephone, and NATO systems. It allows users to keep the same telephone number as they move on the battlefield and will automatically route calls around inoperable nodes. Since market surveys determined that MSE-type systems were already available, the Army decided to follow a non-developmental item (NDI) acquisition strategy to save time, money, and personnel; that is, to accept the best available system.
SOVIET COUNTERPART:	There is no known Soviet counterpart.
PROGRAM STATUS:	The MSE program is progressing according to planned acquisition strategy. The basic MSE contract and the 1st Option were awarded in FY86, the 2nd Option in FY87, the 3rd and 4th Option in FY89 and the 5th Option in FY90. The 3rd Option represented the advancement to full rate production. Procurements from these five awards will equip and field 18 Corps signal battalions, 21 division signal battalions with associated MSE subscriber equipment, the European Army Air Defense Command, and the Fort Gordon and Fort Sill training bases. A successful Follow-on Test and Evaluation of MSE was concluded in November 1988. The results of this test showed that MSE is operationally effective and significantly better than currently fielded area communications equipment. A Follow-on Evaluation (Division) completed in March 1990 demonstrated successful corrective actions, as a result of initial FOTE findings. A Follow-on Evaluation (Corps) scheduled for March 1991 has been rescheduled for FY92 due to DESERT STORM. The Army has successfully completed fielding to III Corps and is currently fielding to V Corps. The fielding schedule is being revised to accommodate DESERT STORM. To date, production and fielding remain on schedule.
CONTRACTOR:	GTE selected by competitive process.

FORWARD AREA AIR DEFENSE C2I


FIRE UNIT DISPLAY
PLATOON LEADERS TACTICAL DISPLAY
BATTALION TACTICAL DISPLAY
BATTALION OPERATION CENTER
PCP
PCP
PCP
ADS
BATTERY COMMAND POST
SENSOR C2
LINE OF SIGHT FORWARD FIRE UNIT
PLATOON COMMAND POST
BATTALION TACTICAL OPERATION CENTER
LEGEND:
THREAT ALERTING & CUEING DATA
COMMAND DATA

Forward Area Air Defense Command, Control and Intelligence (FAAD C2I)

MISSION:

FAAD C2I integrates the Forward Area Air Defense System into a synergistic system of systems capable of defeating the air threat to Army divisions. The distributed FAAD C2I network provides rapid collection, storage, processing, display, and dissemination of critical, time-sensitive air situation and targeting information. Weapon cueing and air situation information is provided by the FAAD C2 system which acquires, correlates and disseminates a composite air picture gathered from a suite of sensors and aircraft identification devices (ground and aerial, passive and active). The communications system ensures reliable, real-time, secure transfer of data between the sensors and weapons and other battlefield users. FAAD C2I provides automation for the Air Defense Control segment of the Army Tactical Command and Control System and assists commanders in planning, coordinating, directing, and controlling the Counter Air fight. FAAD C2I also provides for interoperability with HIMAD, Joint and Allied Air Defense Control systems.

SOVIET COUNTERPART:

The Soviets have deployed and continue to improve a very robust integrated Air Defense Command, Control and Intelligence System.

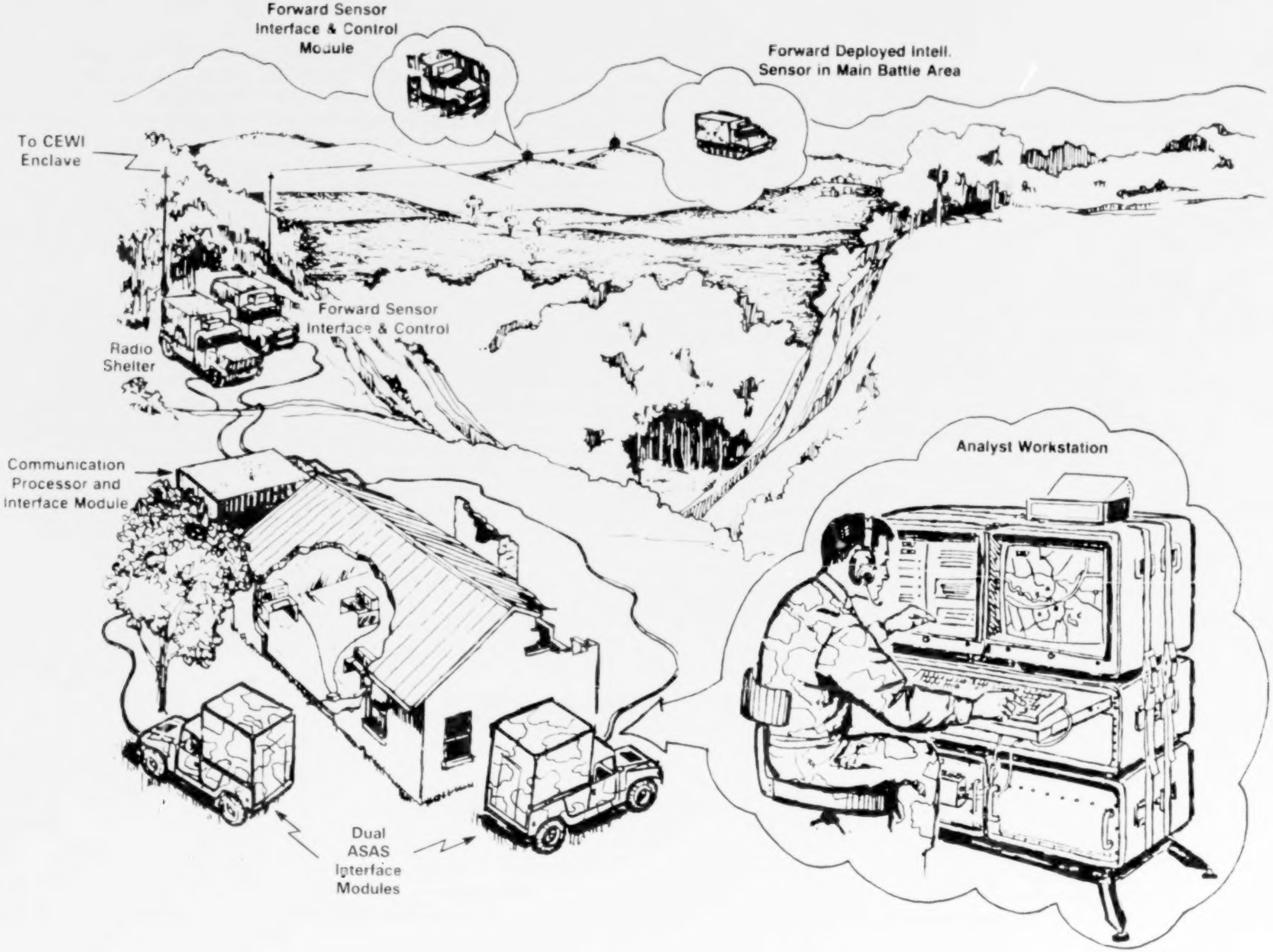
PROGRAM STATUS:

The Full Scale Development contract for software and systems integration of the first phase of FAAD C2 was awarded in FY86. The initial system's detailed design was completed and successfully demonstrated in 1990. The FAAD C2 program was approved for restructure in 1990 and subsequently the contract will be modified in 1991 to field an initial system to Contingency Forces and Light Divisions beginning in FY93. The current contract resulted in an Air Track Management demo completion in May 1990. The next step is to complete the system integration testing of 338K lines of tactical Ada software code with 150K lines of simulation and support code, resulting in a V2 demonstration in 3Q91. Also, a critical design review will be conducted for the next version of software in 4Q91.

CONTRACTOR:

C2 software and development systems integration: TRW (Prime) (Redondo Beach, CA)

ALL SOURCE ANALYSIS SYSTEM


Forward Sensor Interface & Control Module
Forward Deployed Intell. Sensor in Main Battle Area
To CEWI Enclave
Forward Sensor Interface & Control
Radio Shelter
Communication Processor and Interface Module
Analyst Workstation
Dual ASAS Interface Modules

All Source Analysis System (ASAS)

MISSION:

The All Source Analysis System (ASAS) is the central nervous system guiding field commanders to successfully execute the AirLand Battle/Deep Attack, and is the IEW sub-element of the Army Tactical Command and Control System (ATCCS). The ASAS automates command and control of IEW operations and intelligence fusion processing. It generates a near-real-time picture of the enemy situation to guide employment of maneuver forces and systems such as the Joint Surveillance and Target Acquisition Radar System (JSTARS) and the Army Tactical Missile System (ATACMS). Many sophisticated sensor systems provide targeting information; the capability to process and respond to that information is limited, today, by manual and partially automated methods. The ASAS uses state-of-the-art computers to speed the process and improve its accuracy. The ASAS architecture is modular. The data processing module (AIM/DAIM); sensor interface modules that provide a relay between ground-based sensors/sources in forward areas and the data processing modules and provides the interface between the data processing modules and the area communications network (FSIC); and, portable workstations that provide the user an interface with the system (PAWS).

SOVIET COUNTERPART:

There is no known Soviet counterpart.

PROGRAM STATUS:

The program employs an evolutionary acquisition strategy. Testing of system modules began in FY86 and continued through FY89. A Limited Capability Configuration (LCC) was delivered to Ft. Hood in FY89. Initial Operational Test and Evaluation is scheduled for 4QFY92, with a DAB MSIII decision in February 1993. The objective system will evolve through evolutionary development and software refinements based on user feedback.

CONTRACTORS:

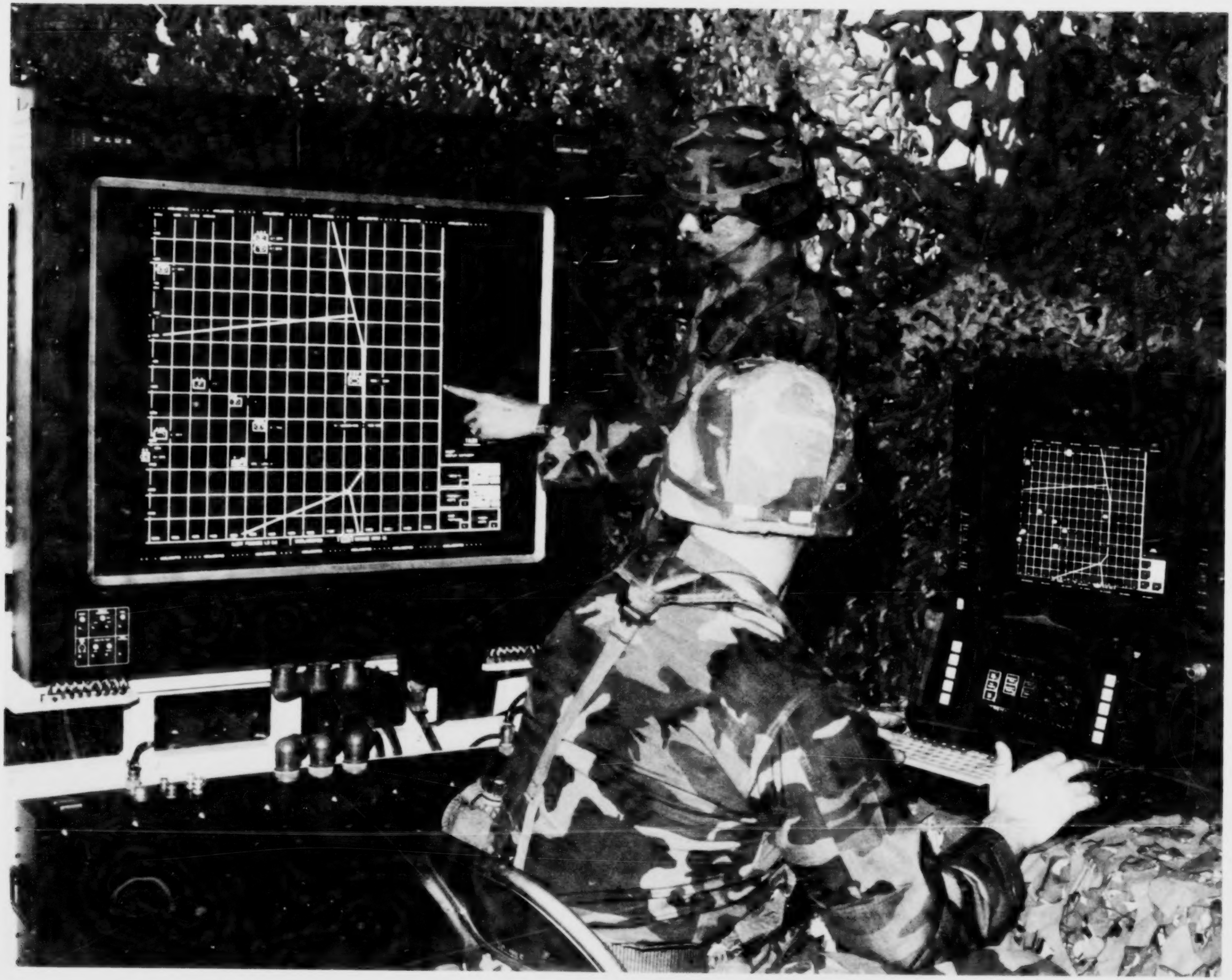
The Jet Propulsion Laboratory (JPL), Pasadena, CA , acts in the role of prime integrator, but is performing under a Task Order against a NASA contract. Competitively selected subcontractors to JPL include Martin Marietta Corporation, Denver, CO, and LORAL Corporation, Palo Alto, CA.

NAVSTAR Global Position System (GPS)

MISSION: The Navstar Global Positioning System (GPS) is a joint Army, Navy, Air Force program with the Air Force as the lead service. It is a space-based navigation, three dimensional positioning and time distribution system that will provide accurate, continuous, all-weather, common grid, worldwide navigation, positioning and timing information to land, sea, air and space-based users. GPS consists of three segments: (1) Space Segment consisting of 24 satellites; (2) Ground Control Segment; and (3) User Segment. The User Segment consists of receiver configurations for manpack/vehicular, low-to-medium and high dynamic aircraft and seacraft applications respectively. The Army is responsible to the Joint Program Office for the testing of manpack/vehicular and low-to-medium dynamic aircraft receivers. The GPS receiver is a passive device that will be deployed extensively at all echelons and with Army aircraft.

PROGRAM STATUS: Navstar GPS received concensus from the Joint Resources management Board in June 1986 to proceed from the Full Scale Engineering Development phase to a Low Rate Initial Production (LRIP). Army testing of the LRIP receivers will be conduced in FY90 with a full production decision made in FY91.

CONTRACTOR:
Rockwell International, Collins Government Avionics Division (Cedar Rapids, IA)
Texas Instrument (Dallas, TX)
Trimble Navigation Limited (Sunnyvale, CA)



Advanced Field Artillery Tactical Data System (AFATDS)

MISSION:

AFATDS will replace the TACFIRE system and will broaden and modernize U.S. Army fire support Command, Control and Communications. It will meet automated fire support requirements of the Army Tactical Command and Control System (ATCCS) during the 1995-2010 timeframe. AFATDS will support close, rear and deep operations; nuclear, non-nuclear and chemical fire planning; and will coordinate the employment of all Service/Combined fire support assets to complement the commander's scheme of maneuver. Compatibility will be provided with all existing and planned U.S. and allied field artillery systems and sensors. AFATDS will also correct the fire control and distribution deficiencies of the current TACFIRE system with no increase in personnel requirements with greatly reduced size, and with a minimized training burden. AFATDS will provide fully automated support for planning, coordination and control of all fire support assets (mortars, close air support, naval gunfire, attack helicopters, offensive electronic warfare, field artillery cannons, rockets and guided missiles) in the execution of close support counterfire, interdiction, suppression of enemy air defense and deep operations.

PROGRAM STATUS:

The Version 1 Full Scale Development contract was awarded to Magnavox in April 1990. The System Requirements Review was conducted in June 1990. FY91 activities will include completion of the software requirements analysis, conduct of the Software Specification Review, completion of the preliminary design and conduct of the Preliminary Design Review.

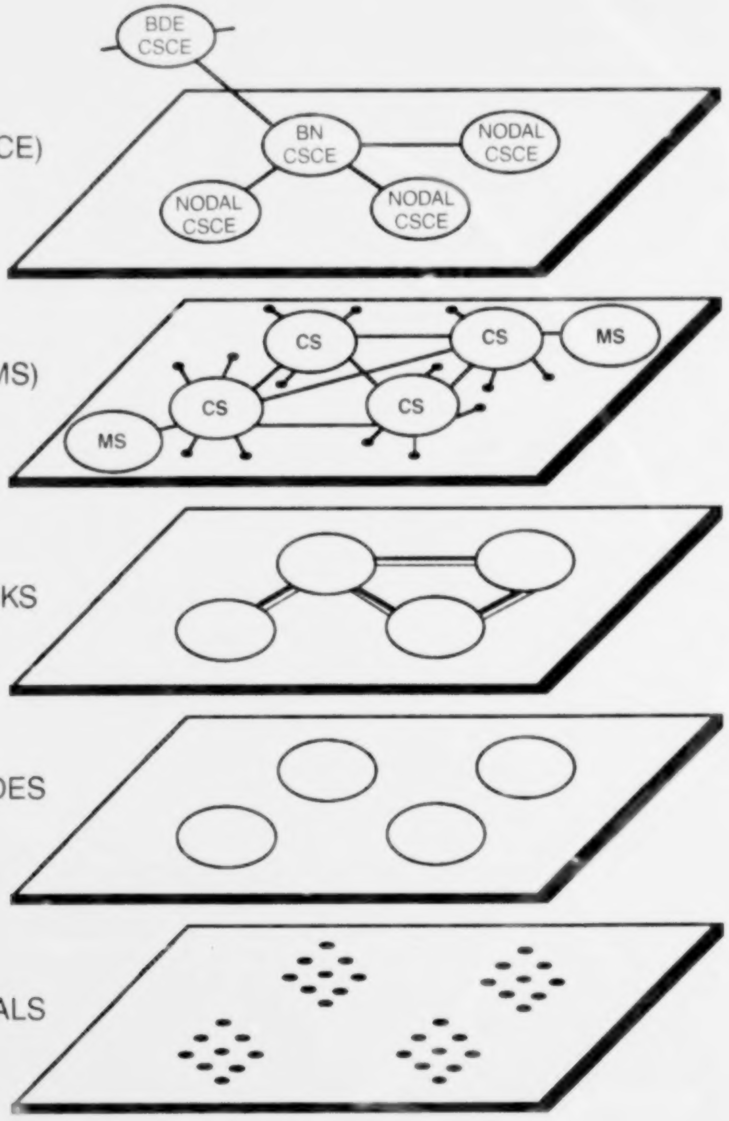
SOVIET COUNTERPART:

The Warsaw Pact has fielded an artillery tactical command and control system. This system has computers at battery, battalion and regiment or brigade level that are digitally linked. These computers perform fireplanning, targeting, logistics and terrain management calculations.

CONTRACTORS:

Software - Magnavox (Ft. Wayne, IN)
Hardware - Miltope (Long Island, NY)

THE ECHELONS ABOVE CORPS COMMUNICATION (EAC COMM) SYSTEM


BDE CSCE
BN CSCE
NODAL CSCE
NODAL CSCE
NODAL CSCE
CS
CS
MS
CS
CS
MS

COMMUNICATIONS SYSTEM CONTROL ELEMENT (CSCE)
(USING DIAL-UP CIRCUITS)

CIRCUIT SWITCHES (CS)/MESSAGE SWITCHES (MS)
AND TRUNKS

TRANSMISSION LINKS

NODES

SUBSCRIBERS/TERMINALS

Echelons Above Corps Communications Program

The Echelons Above Corps Communications (EAC-COMM) Program is a joint service and DOD Agency program to develop and field advanced tactical multichannel switched communications equipment. This equipment will provide the combat forces with the tactical communications needed to meet the mobility, security and reliability requirements to support the AirLand Battle. This program was established to achieve interoperability between service tactical communications systems, interoperability with strategic communications systems, take advantage of recent advances in technology, and eliminate duplication in service developments. Each component of the program is assigned to one of the services to develop and acquire for all of the defense community. The major components assigned to the Army are the AN/TTC-39 family of switches, the AN/TYC-39 Message Switch, multichannel transmission equipment and user message processing devices.

Circuit Switch and Message Switch

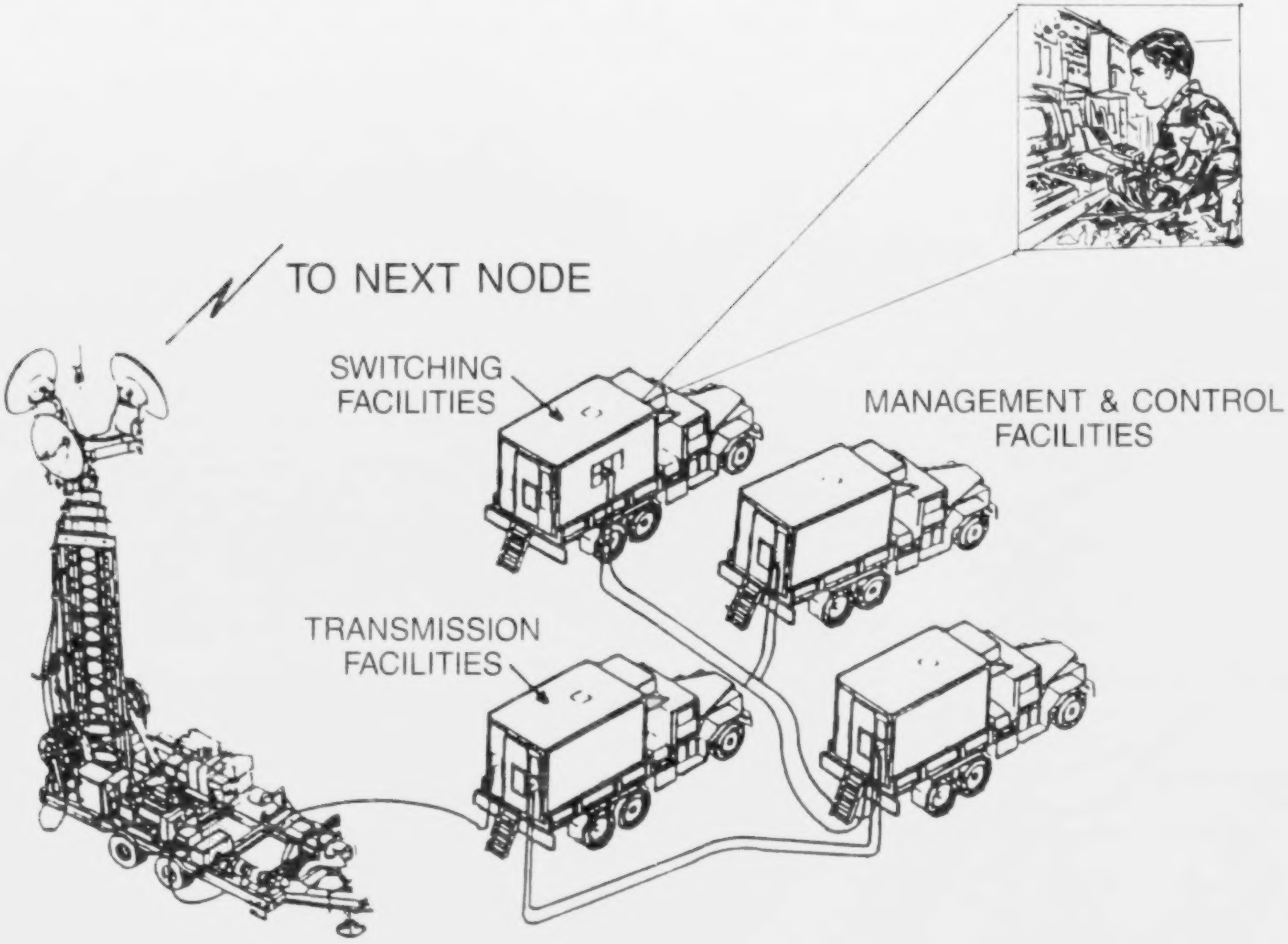
MISSION: This equipment provides automatic switching service, interconnecting analog and digital users between tactical and Defense Communication System (DCS) switches, and between U.S. and NATO national switches. Both switches employ micro-electronic components and design techniques to minimize size, weight, and power consumption. The AN/TTC-39 system is the heart of the multichannel switched network and is a highly efficient means of connecting telephones, message traffic, and data users in both a secure and nonsecure mode in the area network at Echelons Above Corps. Circuit switch modifications include mobile subscriber functions, i.e., flood search routing, automatic subscriber affiliation, and mobile subscriber radio telephone features.

SOVIET COUNTERPART: There is no known counterpart.

PROGRAM STATUS: Both switches were authorized for production in FY80. Fielding of these switches was accomplished in FY86. The Army is currently fielding the improved AN/TTC-39D Circuit Switch. Fielding is to be completed during FY95.

CONTRACTOR: GTE Government Systems Corporation (Waltham, MA)

EAC COMM NODAL CONFIGURATION


TO NEXT NODE
SWITCHING FACILITIES
MANAGEMENT & CONTROL FACILITIES
TRANSMISSION FACILITIES

Digital Transmission Assemblages

MISSION: This equipment represents a family of high capacity, digital radio systems which link circuit and message switches into communications networks supporting telephone and message traffic at the theater tactical level. They also provide the transmission path for linking extension switches at subscriber locations into the main switching network.

SOVIET COUNTERPART: Unknown.

PROGRAM STATUS: Fielding was begun in FY88 and is expected to be completed in FY95.

CONTRACTORS: Digital Group Multiplex Equipment - Raytheon (Marlboro, MA); Group Technologies (Tampa, FL)
Assemblages - Laguna Industries Inc. (Laguna Pueblo, NM)

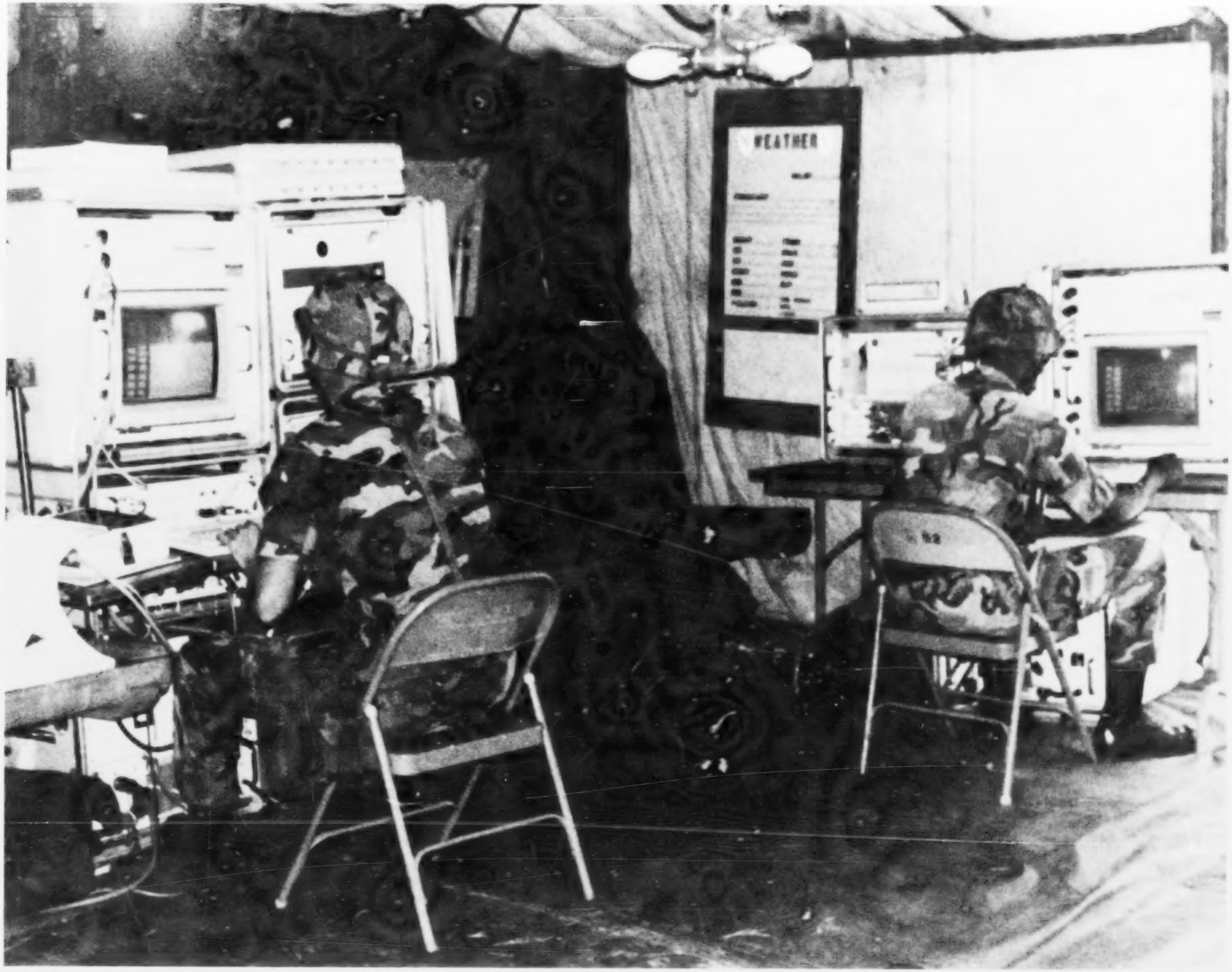
Communications Systems Control Element

MISSION: This network management element provides the capability to plan, engineer, and control the circuit switched network, the message switched network, and the transmission network at signal brigades, battalions, and nodal levels. The distribution of this system and its proximity to the switches provide for the rapid dissemination of directives and reports to the appropriate elements in the network at the time they are needed.

SOVIET COUNTERPART: Unknown.

PROGRAM STATUS: These equipments were authorized for production in FY86, and fielding began in FY90 and will continue through FY95.

CONTRACTORS: Software - GTE (Raleigh, NC)
Hardware - ESI (Richardson, TX)



WEATHER

Maneuver Control System (MCS)

MISSION:

Maneuver Control is one of the five battlefield functional areas (BFA) of the Army Tactical Command and Control System (ATCCS). The Maneuver Control System (MCS) is the force level commander's information system and integrates the maneuver function with the command and control (C2) systems of the other four functional areas (Fire Support, Air Defense, Intelligence/Electronic Warfare and Combat Service Support). MCS serves the commander and staff at Corps, division, brigade, and maneuver battalion, and provides automated assistance in the coordination of plans, dissemination of orders and guidance, and the monitoring and supervision of operations. MCS is a network of stand-alone computer devices with no central node whose loss could cause system failure. It is a hybrid system consisting of both fully militarized and ruggedized commercial Non-Developmental Item (NDI) equipment linked together by standard Army communications systems. Software is written in the DOD standard language, Ada. Since the initial MCS was introduced in Europe in 1981, this program has been, and will continue to be, an evolutionary development. The MCS capability continues to expand in pre-planned, time-phased steps toward the objective system in the mid 1990's. The insertion of an NDI Tactical Computer Processor (TCP) version with that of the fully-militarized Tactical Computer Terminal (TCT) enables the integrated MCS system to capitalize on state-of-the-art, ruggedized commercial equipment and reduce life cycle costs. In its final configuration in the mid-90's, MCS will utilize common hardware being procured for all ATCCS C2 systems.

PROGRAM STATUS:

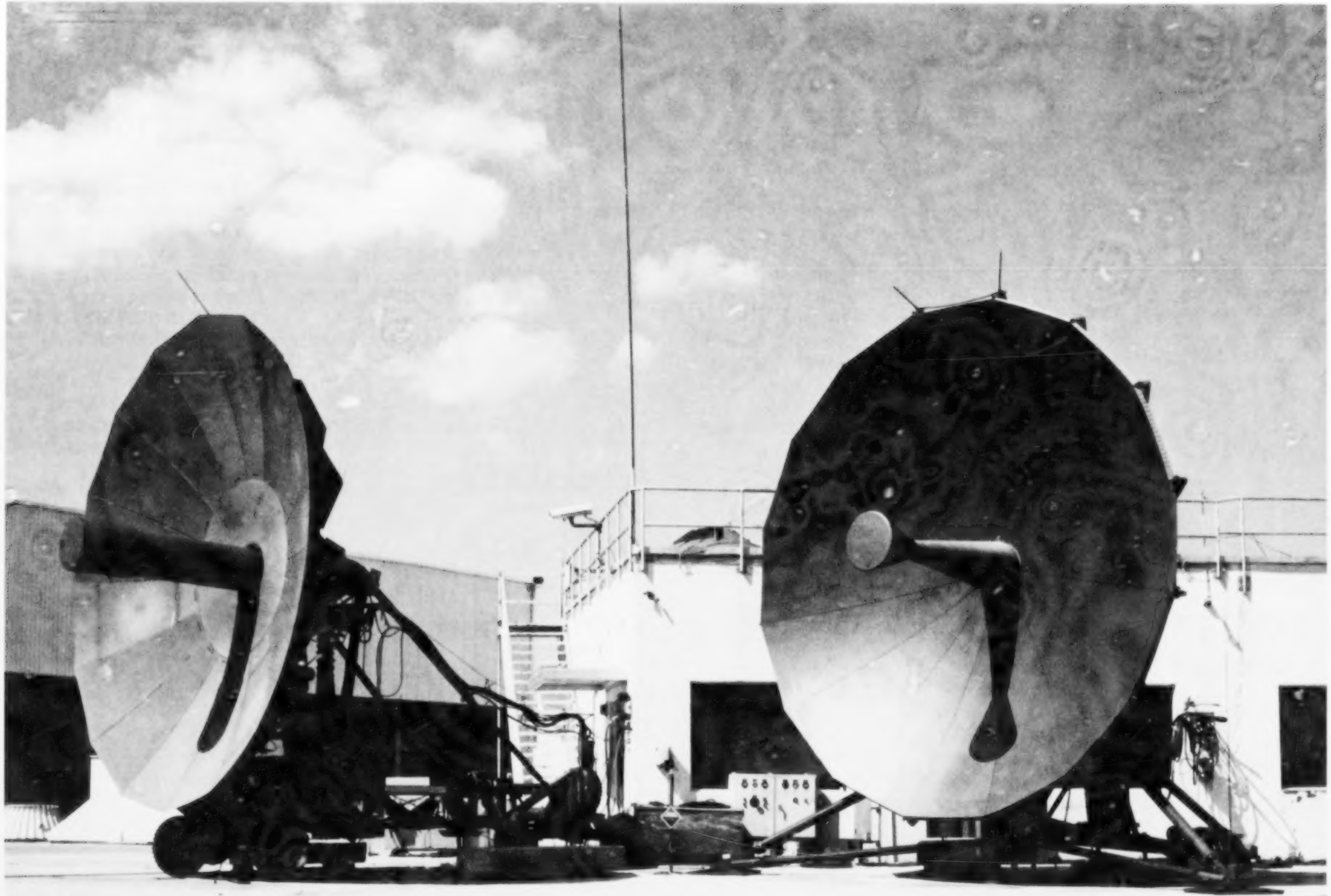
NDI deliveries began in FY89 (first to III Corps) with fielding to be completed in FY91. Common Hardware fielding begins in FY93.

SOVIET COUNTERPART:

There is no know comparable Soviet system.

CONTRACTORS:

Singer Librascope (Glendale, CA) (Militarized)
Loral Command & Control Systems (Colorado Springs, CO) (NDI and software)
TRW (Redondo Beach, CA) (System Engineering and Integration)
MILTOPE (Melville, NY) (Common Hardware/Software)



Military Satellite Communications (MILSATCOM)

MISSION:

The Army's Military Satellite Communication (MILSATCOM) programs include the procurement and development of strategic and tactical satellite terminals, related terminal equipment, and satellite control equipment necessary to satisfy JCS-validated command, control, communications, and intelligence requirements supporting the President, CINCs, National Command Authority (NCA), Military Departments, intelligence community, NATO, and the UK. The MILSATCOM Systems for which satellite terminal, terminal related, and satellite control equipment is being developed and procured by Army include the worldwide Joint ultra high frequency (UHF) FLTSAT/AFSAT system; global super high frequency (SHF) Defense Satellite Communications System (DSCS); and evolving worldwide extremely high frequency (EHF) Military Strategic/Tactical Relay (MILSTAR) system.

PROGRAM STATUS:

In support of the FLTSAT/AFSAT system, Army is procuring additional new AN/PSC-3, AN/VSC-7, and commercial NDI satellite terminals and related equipment to support SOF and contingency unit requirements as well as studying new antenna technologies to provide SOF and other Army forces terminals with added capability and flexibility. Efforts are started to provide the network a demand assigned multiple access capability to increase the capacity of the existing system. In the tactical DCSC, Army is modifying the AN/TSC-85B and AN/TSC-93B terminals to provide the commanders in the field with a new anti-jam (AJ) capability and started efforted to provide the network a demand assigned control apability to increase the capacity of the existing system. Strategically, Army will continue to modify existing Jam Resistant Secure Communications (JRSC) terminals for a high altitude electro-magnetic pulse (HEMP) capability; expand the control subsystem to enhance satellite and communications payload control operations and survivability globally; and commence implementation of a fully automatic Tri-Service simulation system to simplify equipment, network, and system operation and maintenance. In the extremely high frequency (EHF) Army is supporting a more tactically oriented MILSTAR program addressing low data rate manpack terminals and medium data rate multichannel terminals; Army is continuing its Single Channel Objective Tactical Terminal (SCOTT) - AN/TSC-124 terminal test and development program and progressing toward award of the production contract of approximately 60 JCS required SCOTT terminals.

CONTRACTORS:

Harris Corp (Melbourne, FL)
Ford Aerospace Corp (Palo Alto, CA)
GE Corp (Valley Forge, PA)
Titan-Linkabit Corp (San Diego, CA)
Magnavox (Torrence, CA and Leesburg, VA)
Motorola (Scottsdale, AZ)

The Soldier Support mission area includes those items that directly support the individual soldier. This mission area includes organizational clothing and individual equipment, chemical-biological defense equipment, night vision devices and individual weapons (further described on the pages following). As we modernize the Army with new equipment, we must keep the individual soldier equally up-to-date.

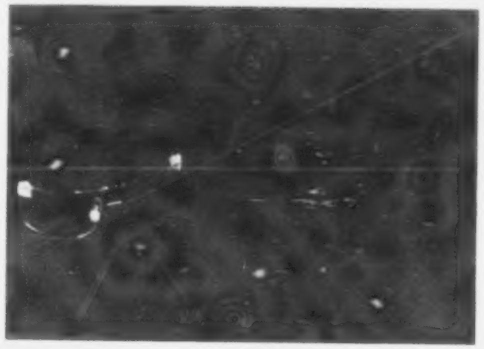
SOLDIER SUPPORT

SOLDIER SUPPORT ITEMS

LOAD BEARING EQUIPMENT =
RECENTLY TYPE CLASSIFIED LOAD BEARING
EQUIPMENT PROVIDES SOLDIER GREATER
COMFORT AND LOAD TAILORING)

PARACHUTISTS ROUGH TERRAIN SYSTEM =
(DEVELOPMENT ITEM TO BE USED BY SPECIAL
OPERATING FORCES)

FIELD PACK LARGE WITH INTERNAL FRAME =
(RENCENTLY TYPE CLASSIFIED PACK TO REPLACE
ALICE PACK AND EXTERNAL FRAME)



BALLISTIC/LASER EYE PROTECTION=
(DEVELOPMENTAL ITEM TO PROVIDE SOLDIER
WITH PROTECTION FROM SMALL GRAIN
FRAGMENTS AND SELECTED LASERS)

BODY ARMOR COUNTERMINE=
(DEVELOPMENTAL ITEMS TO BE USED
TO DEFEAT SMALL MINES PRIMARILY
FOUND IN LOW INTENSITY ENVIRONMENTS)

SOLDIER SUPPORT

OBJECTIVES AND CHARACTERISTICS

SOLDIER SUPPORT includes several related programs which respond to changing threat requirements and advances in state-of-the-art technology to enable the soldier to fight more effectively and survive better under all battlefield conditions. These include:

CLOTHING AND INDIVIDUAL EQUIPMENT (CIE) research and development provides quality dress and personal uniforms, as well as quality and effectiveness in combat clothing and individual equipment. Currently, emphasis is placed on combat CIE to improve soldier capability to counter newly emerging battlefield threats. Research and development is focused on the design of lighter weight equipment, ballistic and laser eye protection, and improved chemical protective clothing which take advantage of the latest progress in technology and advanced materiels. Over thirty projects are in progress to enhance soldier survivability and effectiveness. CIE research and development is managed by the Project Manager-Clothing and Individual Equipment, Woodbridge, Virginia. Natick Research Development and Engineering Center, Natick, Massachusetts is the Army's primary developer for CIE.

CHEMICAL-BIOLOGICAL DEFENSE (CBD) equipment is being developed to permit the soldier to survive and continue his mission with minimal performance degradation on the chemical-biological contaminated battlefield. CBD development includes items for improved eye and respiratory protection, personal and individual equipment decontamination, collective protection and detection and warning of chemical and biological hazards. The Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland is the Army's primary developer of CBD equipment.

NIGHT VISION DEVICES allow the individual soldier to function as well during night operations as during the day. These devices enable the soldier to locate, identify, and engage targets during periods of darkness and reduced visibility (haze, fog, and smoke). Future technology will focus on miniaturizing and reducing weight of the device, while lowering life cycle costs. The objective is to make these devices available to more soldiers, while ensuring that the sights are effective and convenient to use. Night vision development is conducted at the Night Vision and Electro-Optical Laboratory at Fort Belvoir, Virginia.

INDIVIDUAL WEAPONS. The M16A2 rifle (5.56mm) is an improved version of the older M16A1 rifle. The 9mm handgun is replacing the .45 cal and .38 cal pistols with 4 inch barrels.

PROGRAM STATUS:

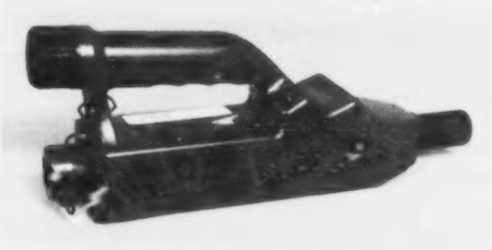
Currently there are 43 clothing and individual equipment R&D projects ongoing which have been approved by the Chief of Staff, Army. Projects include laser/ballistic eye protection, self contained chemical uniform, flechette ballistic vest, aircrew cold weather uniform, and equipment airdrop containers. Also, 24 product improvements to fielded items are being worked. These include improved aircrew/CVC cooling vest, vapor barrier boot, extra large PASGT helmet, hot weather battledress uniform, improved chemical/biological glove, combat boot sock, and wet weather parka/trousers. During 1991/1992, 9 items are expected to be approved and type classified. These will include the 40mm grenade vest, interim self contained chemical uniform, enhanced SPH4 aviator helmet, gross chemical protection overgarment, laser/ballistic eye protection, sleeping bag pad, and parachutists rough terrain suit, intermediate cold wet boots, and intermediate cold wet glove.

NUCLEAR, BIOLOGICAL, AND CHEMICAL DEFENSE

XM28 TEMPER TENT LINER

XM28 TEMPER TENT LINER

M40 CHEMICAL/BIO PROTECTIVE MASK



CHEMICAL AGENT MONITOR

M43 CHEMICAL/BIO PROTECTIVE MASK

NBC RECONNAISSANCE SYSTEM. . .FOX

XM21 REMOTE SENSING
CHEMICAL ALARM

LIGHTWEIGHT DECONTAMINATION
SYSTEM

NUCLEAR, BIOLOGICAL, AND CHEMICAL DEFENSE

MISSION:

Nuclear, biological and chemical (NBC) defense provides essential defensive materiel to allow U.S. Forces to sustain warfighting capability on the contaminated battlefield. NBC defense doctrine requires contamination avoidance when the scheme of maneuver permits; soldier protection from incapacitating or lethal agent effects, NBC survivable equipment, and effective decontamination. Implementation of this doctrine requires effective capabilities for reconnaissance, detection and identification; individual and collective personnel protection; decontamination of personnel and equipment, and medical management of NBC casualties. Effective NBC defensive capability contributes to the deterrence of development and employment of NBC weapons against U.S. Forces.

SOVIET COUNTERPARTS:

Even though negotiating a chemical weapons treaty with the U.S., the Soviet Union still has an extensive chemical weapons arsenal and is known to possess the means to field biological weapons. Nations aligned with the Soviet Union are known to possess chemical and biological weapon systems and these weapons are becoming widespread in the Middle East. Both chemical and biological (C/B) weapons are a threat to U.S. forces participating in Operation DESERT STORM.

PROGRAM STATUS:

NBC Defense technology initiatives emphasize Advanced Transition Technology Demonstration (ATTD) programs that speed up the maturing of advance technologies and reduce risk in the development of next generation and future materiel systems. Cooperative NBC Defense technology programs leverage U.S. research and development efforts with Canada and the United Kingdom on the Bio-Chemical Detector, and with France on a Laser Stand Off Chemical Detector. NBC defense equipment currently in production and/or being fielded includes: the NBC Reconnaissance System (NBCRS) which provides a first time capability to rapidly find, identify, report and avoid battlefield contamination; the AN/VDR 2 Radiac Set to detect nuclear radiation; the M40 C/B protective mask for individual soldiers; the M43 C/B protective mask for AH-64 (Apache) helicopter crews; the M17 Lightweight Decontamination System; and the M20 Simplified Collective Protection Equipment. Equipment currently being developed includes: the XM21 Remote Sensing Chemical Agent Alarm, the XM22 Automatic Chemical Agent Alarm for point detection, the Chemical Agent Detector Network (CADNET), the Multipurpose Integrated Chemical Agent Alarm (MICAD), the Modular Decontaminating System (MDS), the XM295 Individual Equipment Decontamination Kit, and the Decontaminating Agent: Multipurpose (DAM) to replace bulk DS2 and provide a safe and environmentally acceptable material for equipment decontamination. Medical Chemical Defense program initiatives included accelerated fielding of the M291 skin decontamination kit and a convulsant antidote for nerve agents. Development efforts continue for an enhanced therapeutic drug against nerve agents, a topical skin protectant, a multi-chambered autoinjector, and various biological defense vaccines including Rift Valley Fever, Q-fever CMR, and tularemia vaccines.

CONTRACTORS:

Battelle Memorial Institute (Columbus, OH)
Brunswick Defense (Deland, FL)
Engineered Air Systems, Inc. (St. Louis, MO)
ETG, Inc. (Towson, MD)
Nuclear Research Corp. (Dover, NJ)
General Dynamics Land Systems (Detroit MI)
Mine Safety Appliance (Pittsburgh, PA)
ILC Dover (Dover, DE)
Michigan Department of Public Health (Lansing, MI)
Rohm and Haas Co. (Springhouse, PA)

NIGHT VISION DEVICES

AVIATOR'S NIGHT VISION IMAGING-SYSTEM, AN/AVS-6 (ANVIS)

NIGHT VISION GOGGLES, AN/PVS-7A, B

INDIVIDUAL SERVED WEAPON SIGHT, AN/PVS-4

Night Vision and Electro-Optics

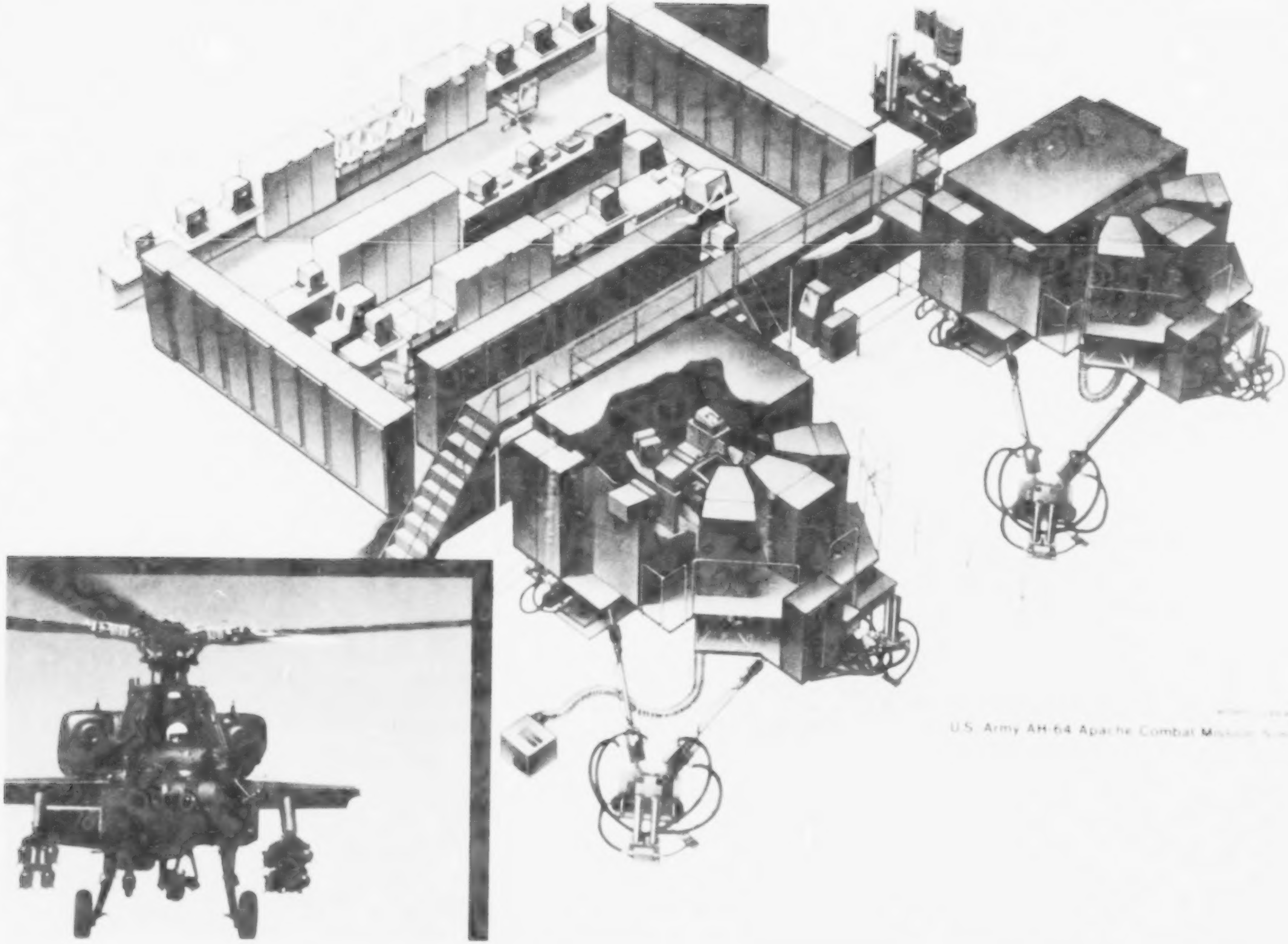
MISSION: The soldier operates more effectively at night through use of night vision image intensification (I2) and laser/thermal technologies. Some of the fielded systems are shown on the opposing page. The AN/PVS-4 Individual Served Weapon Sight provides passive sighting and viewing using second generation image intensification techniques. The AN/PVS-4 is designed primarily for use with the M14 and M16 rifles, the M60 machine gun, the M72A1 rocket launcher and the M203 grenade launcher. It can also be used by a commander for surveillance. The AN/PVS-7 Night Vision Goggle (NVG) provides passive sighting and viewing using third generation (high performance) image intensification techniques. The AN/PVS-7 is a lightweight, headmounted monocular unit. It is used to operate ground vehicles, for navigation, map reading, maintenance, first aid, etc. The AN/AVS-6 Aviaition Night Vision Imaging System (ANVIS) is a lightweight, high performance binocular unit using third generation image intensification techniques. The AN/AVS-6 was designed specifically for use by helicopter pilots during night flights including Nap-of-the-Earth (NOE) missions. The AN/PAQ-4A Infrared Aiming Light (not shown) can be mounted on and boresighted to the M16A1/A2 rifle, M60 machine gun, M67 recoilless rifle and the M72A1 rocket launcher. The AN/PAQ-4A provides accurate target sighting by the placement of an infrared beam on the target which can only be seen with the use of the NVG. Two image intensification testing devices are currently in production, the Test Set, Electronics Systems, TS-3895A/UV and the TS-4348/UV. The TS-3895A/UV is intended for use at intermediate maintenance levels and can provide performance testing and fault isolation. The TS-4348/UV provides a subjective (Go/No-Go) assessment of operational performance and can be used at unit and direct support maintenance levels. In the Laser/Thermal area, two Development Production Prove Out (DPPO) contracts are underway for devices (not shown) currently in development. The AN/PVS-6 Mini Eyesafe Laser Infrared Observation Set (MELIOS) is a rangefinder which measures and displays range and will have the capability to provide compass headings and vertical angle measurement under a future P3I effort. The Thermal Weapon Sights (TWS) are infrared imaging devices used for surveillance and fire control of individual, crew served and heavy weapons during daylight, darkness and in dirty battlefield conditions.

SOVIET COUNTERPARTS: The Soviets have some second generation devices, however, they do not have third generation (high performance) image intensification technology.

PROGRAM STATUS: There are presently several ongoing contracts for production of image intensification and laser/thermal devices and spares. Plans for additional device acquisitions are under preparation.

CONTRACTORS:

ITT Corp, Electro-Optical Production Division (Roanoke, VA)
IMO/Optic-Electronic Corp (Dallas, TX)
IMO/Varo, Inc. (Garland, TX)
Varian Associates, Varian Image Tube Division (Palo Alto, CA)
Hughes Optical Products, Inc. (Des Plaines, IL)
IMO/Baird Corp (Bedford, MA)
Insight Technology Inc. (Manchester, NH)



U.S. Army AH-64 Apache Combat Mission Simulator

Synthetic Flight Training Systems

MISSION: The Army is acquiring flight simulators to improve training effectiveness, maintain combat readiness, and cope with current and future operating costs. This is being accomplished by providing high fidelity simulations of helicopter flight including nap-of-the-earth, combat environment, day/night, instrument flight, and weapons engagements with enemy interaction, while at the same time, providing realistic and cost effective trainers. The Army's Synthetic Flight Training Systems (SFTS) are high fidelity, computer driven, flight weapon and mission simulators for the UH-1, MH/CH-47, AH-1, MH/UH-60 and AH-64 helicopters. The UH-1 simulator is an instrument flight and emergency procedures trainer mounted on a 5-degree-of-motion base. The remaining simulators are more complex devices mounted on advanced technology 6-degree-of-motion platforms, with cockpit window visual presentations for tactical, nap-of-the-earth mission training. The MH-60K and MH-47E simulators simulate the aircraft's terrain following/terrain avoidance radar systems and have enhanced visual systems that allow for shipboard operations and air refueling. All weapon systems in the attack helicopters are replicated for aircrew gunnery training and the threat is modeled to engage its systems when the aircraft maneuvers within their weapon's maximum effective range.

SOVIET COUNTERPART: There is no known comparable Soviet flight simulation capability but they do have flight simulators.

PROGRAM STATUS: The total program is for 22 UH-1, one MH-47, six CH-47, one MH-60, 18 UH-60, nine AH-1, and 12 AH-64 combat mission simulators. Twenty-two UH-1, six CH-47, nine AH-1, 17 UH-60 and six AH-64 simulators have been fielded. Additional UH-60 and AH-64 simulators will be fielded through FY94. A contract for one MH-47E Simulator (with option for one MH-60K Simulator) was awarded in September 1988 to support the Special Operations Forces.

CONTRACTOR: CAE - Link Corporation, a CAE Industries LTD Company (Binghamton, NY)

23350
UNITED STATES

Air Ground Engagement System II (AGES II)

MISSION:

The AGES II systems augment the Multiple Inegrated Laser Engagement Simulation (MILES) and allow the divisions aviation assets to conduct force-on-force level training with MILES equipped units. The AGES II systems simulate the threat and vulnerability characteristics of the host platform by using eye-safe low power lasers and laser detectors. The AGES II systems include weapon simulation, vulnerability simulation and control subsystems. These functions provide AGES II the capabilities to perform a simulation of war fighting capabilities in a training environment without utilizing live ammunition. AGES II supports Army training by providing commanders with the ability to judge the performance of the unit and assess collective training shortcomings. The AGES II systems are planned to be used at home station and at the Combat Training Centers (CTC) during tactical training/Force-on-Force exercises. Air-to-ground weapons include HELLFIRE, 30mm Gun, and 2.75 Rockets. AGES I was the earlier program that has fielded devices for the AH-1, UH-1, Stinger, Vulcan, etc.

SOVIET COUNTERPART:

Unknown

PROGRAM STATUS:

FIELDED	IN PRODUCTION	FULL SCALE DEVELOPMENT
(AGES I)	(AGES II)	
AH-1S	UH-60	AH-64B
UH-1	CH-47D	OH-58D (WARRIOR)
OH-58	OH-58D	
UH-60 (INTERIM)	HGSS (G/YLLD)	
	AH-64A (INTERIM)	

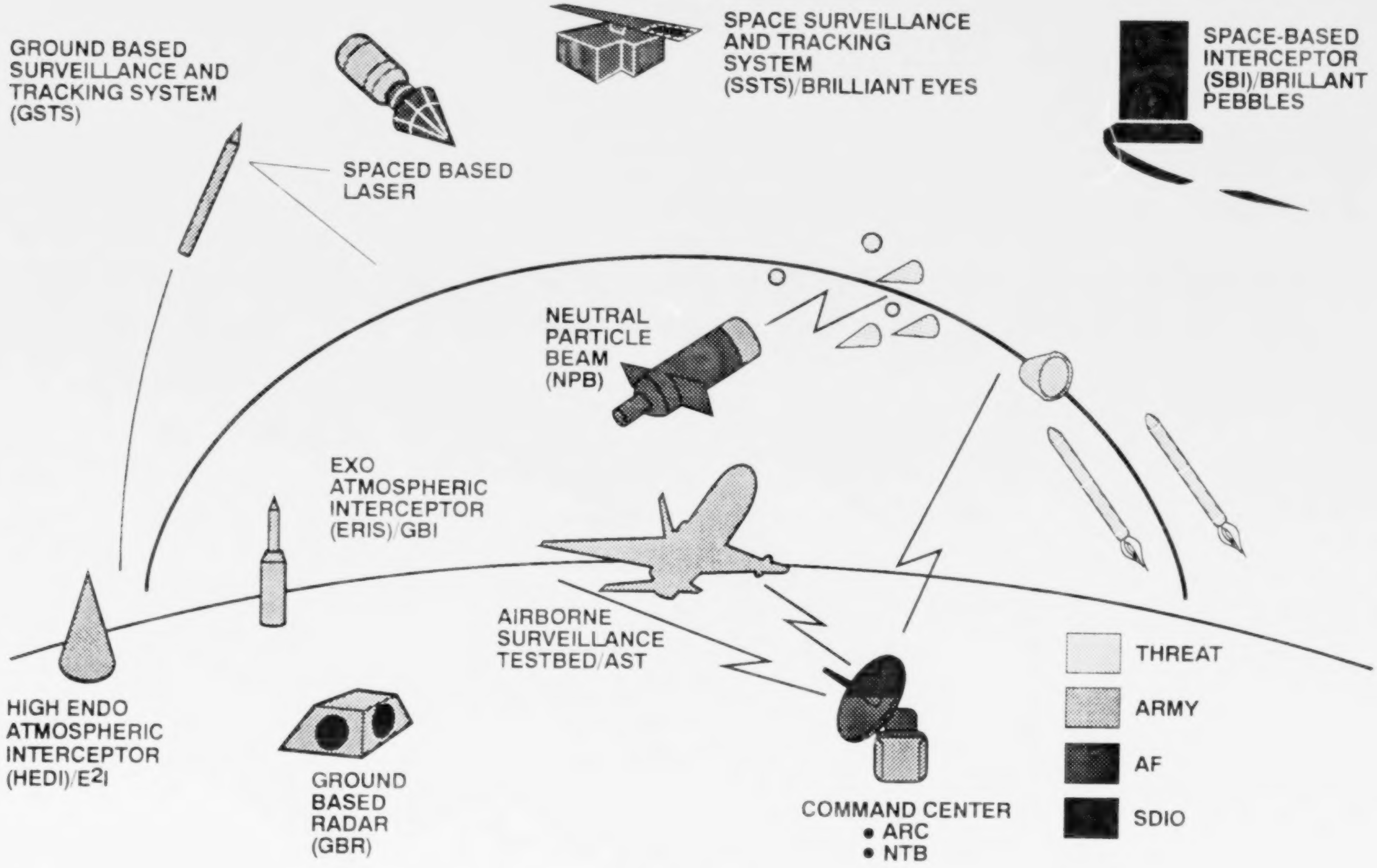
CONTRACTOR:

Loral Electro Optical Systems (LEOS) (Pasadena, CA)

The Strategic Conflict mission area relates to inter-continental or transoceanic inter-theater conflict. The US Army Strategic Defense program is the Army's only strategic weapons development program.

STRATEGIC CONFLICT

SERVICE INVOLVEMENT


GROUND BASED SURVEILLANCE AND TRACKING SYSTEM (GSTS)
SPACED BASED LASER
SPACE SURVEILLANCE AND TRACKING SYSTEM (SSTS)/BRILLIANT EYES
SPACE-BASED INTERCEPTOR (SBI)/BRILLANT PEBBLES
NEUTRAL PARTICLE BEAM (NPB)
EXO ATMOSPHERIC INTERCEPTOR (ERIS)/GBI
AIRBORNE SURVEILLANCE TESTBED/AST
HIGH ENDO ATMOSPHERIC INTERCEPTOR (HEDI)/E2I
GROUND BASED RADAR (GBR)
COMMAND CENTER
• ARC
• NTB
□ THREAT
▨ ARMY
■ AF
■ SDIO

U.S. ARMY STRATEGIC DEFENSE COMMAND

MISSION:

The U.S. Army Strategic Defense Command (USASDC) is a major contributor to the Department of Defense Strategic Defense Initiative (SDI). The mission of the command is to conduct a coordinated research program, within DOD, SDIO and Army guidance, and to insure timely, cost effective development of technologies for ballistic missile defense. Also included in USASDC's mission is the development of Tactical Missile Defense (TMD) technologies, the management of the Kwajalein Atoll as a National Missile Range, and the management of the High Energy Laser System Test Facility (HELSTF), White Sands Missile Range, NM. Additionally, USASDC has the DOD-directed mission to develop a Kinetic Energy (KE) antisatellite (ASAT) capability.

PROGRAM STATUS:

In FY91 USASDC is managing an SDI research program of about $1.3 billion within five functional areas of ballistic missile defense: Surveillance, Acquisition, Tracking, and Kill Assessment (SATKA); Kinetic Energy Weapons (KEW); Directed Energy Weapons (DEW); Systems Analysis/Battle Management (SABM); and Survivability, Lethality and Key Technologies (SLKT). USASDC's research focuses on demonstrating the technologies which will allow for the deployment of a multilayered Strategic Defense System (SDS). Also included in this funding are efforts in coordination with our allies for the development of architectures, system technologies, and testbeds required for an effective theater missile defense. We are also managing SDIO's Theater Missile Defense Initiative (TMDI) program which was funded at $218 million in FY91.

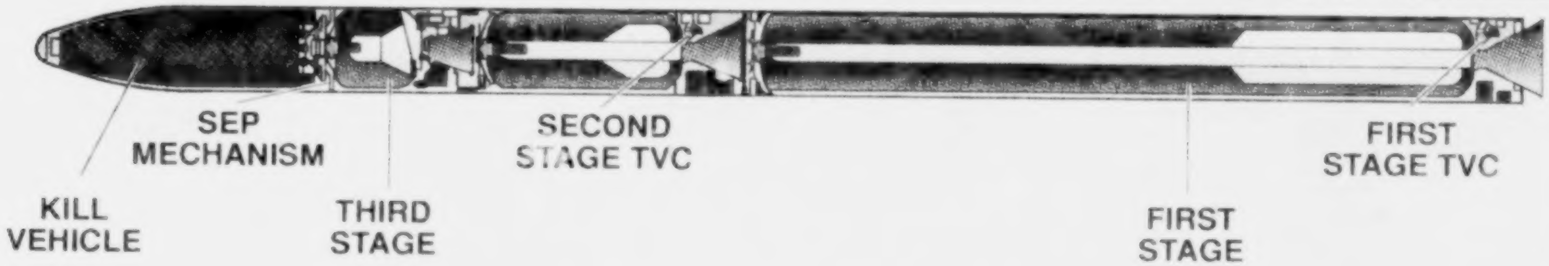
In September 1987 and October 1988 the Defense Acquisition Board completed a review of the SDS and directed that Phase I of the program proceed from concept validation into demonstration and validation. The FY91 Defense Authorization/Appropriation Bills changed SDI's emphasis from five functional areas to five program areas: Phase I, Limited Protection System, TMD, Follow-on effort and, Research and Support Activities. Component systems in the follow-on phases will continue to undergo basic technological research and level funding. The schematic drawing depicts the major SDI programs managed by the Army, Air Force and SDIO. Army components include: The High Endoatmospheric Interceptor, which is the base technology program for a second generation interceptor known as E2I; the Exoatmospheric Reentry Vehicle Intercept Subsystem (ERIS), which is also the base technology effort for the follow-on GBI program; the Ground-based Surveillance and Tracking System (GSTS); the Battle Management, Command Control and Communications (BM/C3) support for these systems, and the Ground Based Radar (GBR), which was recently approved as a Phase I element. In addition, the Army manages the Neutral Particle Beam (NPB) and the Airborne Surveillance Testbed (AST), formerly known as the Airborne Optical Adjunct (AOA). The Air Force and SDIO have developmental responsibility for the remaining systems.

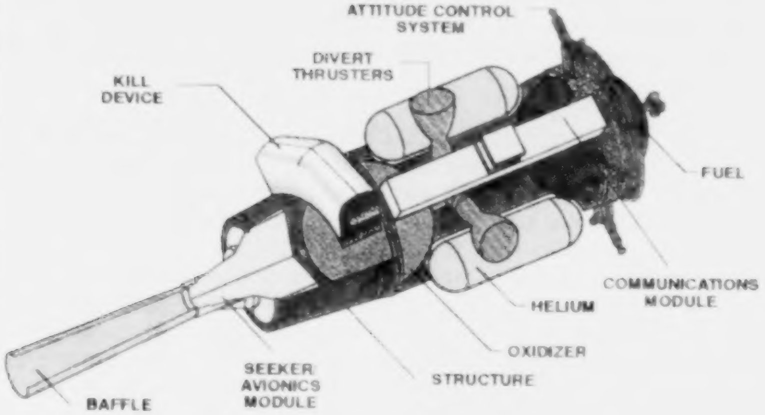
In FY92 the program will build upon current technological developments through focused investigations, experiments, and functional technology validations. The emphasis will be to demonstrate and validate technologies while sustaining the technological base for the systems in the follow-on phases. Some major USASDC initiatives are detailed in the pages which follow.

SOVIET COUNTERPART:

The Soviets are maintaining and upgrading the world's only operational Ballistic Missile Defense System around Moscow, and in addition are conducting a very active research and development program in more advanced BMD technologies.

WEAPON SUBSYSTEM (U)


SEP MECHANISM
SECOND STAGE TVC
FIRST STAGE TVC
KILL VEHICLE
THIRD STAGE
FIRST STAGE


ATTITUDE CONTROL SYSTEM
DIVERT THRUSTERS
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FUEL
COMMUNICATIONS MODULE
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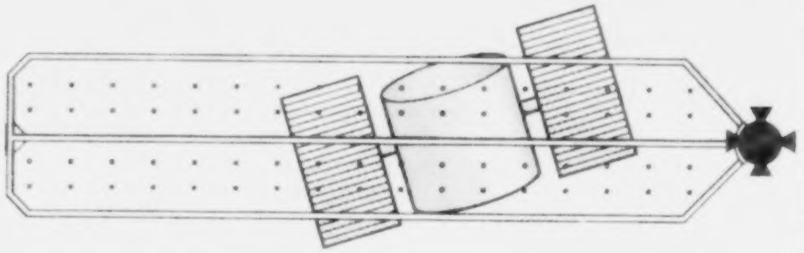
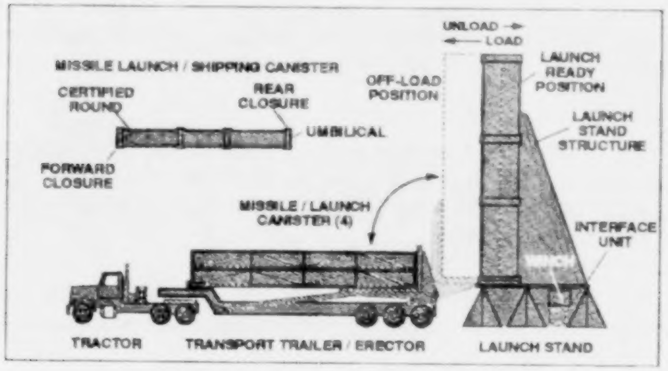
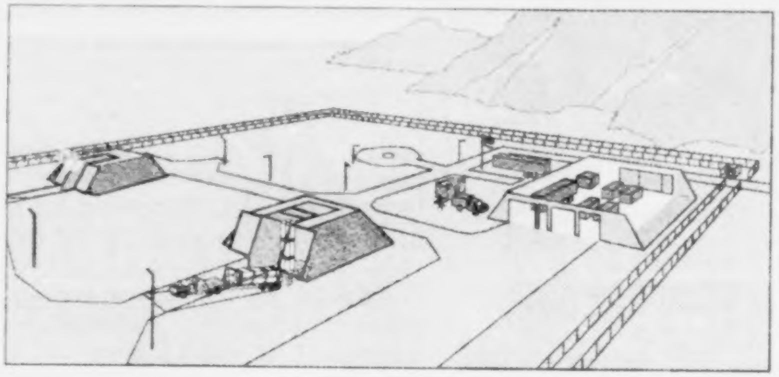
OXIDIZER
STRUCTURE
BAFFLE
SEEKER AVIONICS MODULE



DEPLOYED KD


UNLOAD →
← LOAD
MISSILE LAUNCH / SHIPPING CANISTER
CERTIFIED ROUND
REAR CLOSURE
UMBILICAL
FORWARD CLOSURE
OFF-LOAD POSITION
LAUNCH READY POSITION
LAUNCH STAND STRUCTURE
MISSILE / LAUNCH CANISTER (4)
INTERFACE UNIT
WINCH
TRACTOR
TRANSPORT TRAILER / ERECTOR
LAUNCH STAND



GROUND-BASED ANTI-SATELLITE (ASAT) SYSTEM

MISSION:

The objective of the ASAT System is to achieve space control. Space control is a warfighting mission of the U.S. Space Command and its components. ASAT weapons and their command and control elements constitute the space forces necessary to execute space control operations. Accomplishing this mission requires the ability to provide space surveillance, actively defend friendly space systems against a variety of threats, disrupt, degrade, and destroy the warfighting potential of enemy space systems, and engage enemy forces attacking in space.

The military strategy for space supports U.S. policy objectives and Army mission requirements: deterrence and, if necessary, defense against enemy attack; assured access to and freedom of action in space; negation of hostile space systems; and enhancement of the operations of U.S. and Allied forces. The ASAT System will operate across the spectrum of conflict.

SOVIET COUNTERPART:

Indicative of the Soviets' military program of space is their development and maintenance of the world's only currently operational ASAT System, a ground-based co-orbital interceptor. Using a radar sensor and a pellet-type warhead, the interceptor can attack all current low-altitude satellites. Other Soviet systems have ASAT capabilities. The nuclear-armed GALOSH ABM interceptor deployed around Moscow has an inherent ASAT capability against low-altitude satellites. Some of the lasers located at the Sary Shagan Missile Test Center may be capable of damaging sensitive electronic warfare against space systems.

PROGRAM STATUS:

As the result of a February 1990 Defense Acquisition Board decision, the Department of Defense designated the Army as interim lead service for the development of a Kinetic Energy (KE) ASAT System. The Army selected BG J. Morgan Jellett to lead the Joint ASAT development effort. A Joint Program Office has been established at the Army Strategic Defense Command facilities in Huntsville, Alabama, and the Air Force has provided a Deputy Program Manager. Alternative concepts for land and/or sea based versions were presented at a Defense Acquisition Board Review for final concept selection. A small land based set option was selected to be managed by the Army. In preparation for the Milestone I decision, an initial Cost and Operational Effectiveness Analysis, and a Test and Evaluation Master Plan were developed along with Life Cycle Cost Estimates for both the Kinetic Energy weapon system and the surveillance and BM/C3 portion of the program. In addition to the KE ASAT effort, the Defense Acquisition Board also directed parallel Directed Energy ASAT development efforts by the Army and the Air Force. The prime candidate for a directed energy ASAT System is the Ground Based Free Electron Laser which is being developed by the Army Strategic Defense Command under the Strategic Defense Initiative. A downselection for the Directed Energy ASAT device is planned for FY95.

CONTRACTORS:

On 13 July 1990, Rockwell International Corporation of El Segundo, California, was selected by the Strategic Defense Command to produce a KE weapon ASAT System for the Demonstration/Validation portion of the program.

GROUND-BASED INTERCEPTOR (GBI)

MISSION:

The Ground-Based Interceptor (GBI) is designed to conduct non-nuclear intercepts of reentry vehicles (RV) dispersed from Intercontinential Ballistic Missiles (ICBM) and Submarine-Launched Ballistic Missiles (SLBM). Midcourse sensors will acquire, track, and pass target cluster information to the GBI interceptor element which will launch the interceptor toward the cluster. The GBI will acquire and track the target cluster, discriminate (determine which objects are reentry vehicles), communicate target information to follow-on interceptors, and intercept the target.

CHARACTERISTICS:

The GBI is a lightweight vehicle, incorporating a sophisticated multi-band seeker and onboard data processor, which is designed to provide low cost per RV kill, estimated to be $1-2 million. The GBI is designed to acquire and discriminate the target in the presence of decoys, use the extremely high kinetic energy of target impact to cause a non-nuclear kinetic kill. An interceptor-to-interceptor communication system will inform following interceptors of real time discrimination data. A lethality enhancement device may be utilized to increase the interceptor's lethal radius and negate threat countermeasures.

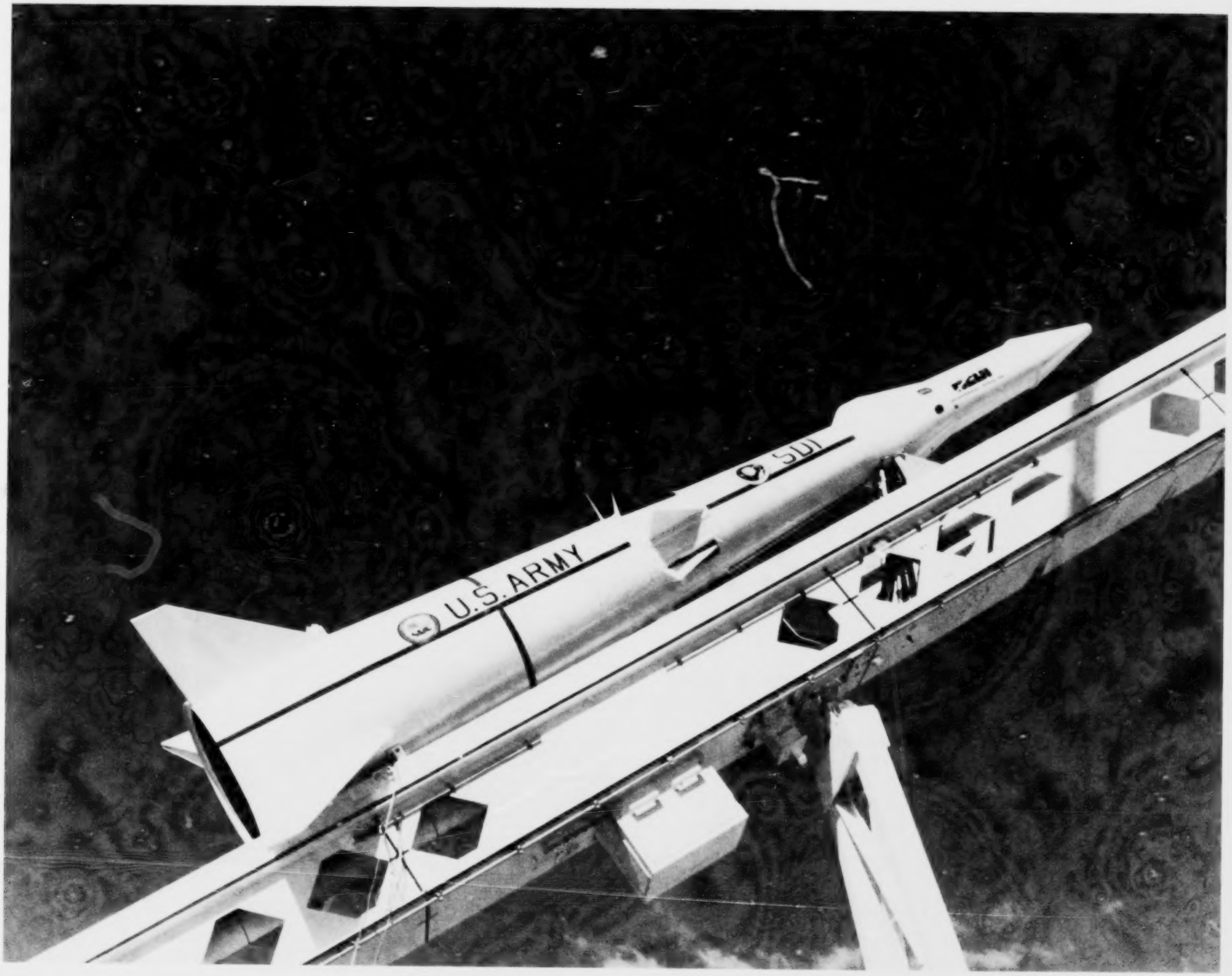
PROGRAM STATUS:

The GBI program consists of two phases, ERIS FTV and GBI-X, to resolve critical interceptor issues prior to FSD. The basic interceptor functions will be validated in a series of three FTV flight tests taking place in FY91. Each test will address increasingly stressing threat levels. Once these basic functions are demonstrated, GBI-X will extend the issue resolution process and incorporate the latest technologies to reduce interceptor weight enhance interceptor capability to perform onboard discrimination. The GBI baseline design process is supported by GBI-X Concept and Technology Integration (CTI) contracts performed by three prime contractors. The CTI contract to design, build and flight test kill vehicles is designed to address and prove solutions to critical GBI issues. Multiple awards assure three independent solutions to the technology challenge and assure strong competition in the GBI area. Once the baseline is developed and critical issues resolved, the GBI will be recompeted for FSD. The Experimental Test Bed (XTB) will use the same FTV booster and test hardware and will flight test GBI-X vehicles based on advanced technologies in the areas of improved seeker, cooled optics, fiber optic gyro, improved avionics, and reduced system size.

CONTRACTORS:

ERIS FTV
Lockeed (Prime) (Sunnyvale, CA)
Texas Instruments (Seeker) (Dallas, TX)
Honeywell (Avionics) (Clearwater, FL)
Kearfott Navigation Controls Co (IMU) (Little Falls, NJ)
TRW (Divert Propulsion) (Redondo Beach, CA)
Hercules (Booster Propulsion) (Magna,UT)
Rocket Research (Lethality Enhancement) (Redneon, WA)

GBI-X CTI
Hughes Aircraft Company (Prime) (Canoga Park, CA)
Martin Marietta Missile Systems (Prime) (Orlando, FL)
Rockwell International (Prime) (Seal Beach, CA)


U.S. ARMY
SD1

HIGH ENDOATMOSPHERIC DEFENSE INTERCEPTOR (HEDI)

MISSIONS:

HEDI KITE: HEDI Kinetic Kill Vehicle Intergrated Technology Experiment (KITE) is a ground-based, hypervelocity, high acceleration, interceptor technology experiment designed to address and resolve critical issues associated with performing endoatmospheric intercepts.

HEDI E2I: HEDI Endoatmospheric/Exoatmospheric Interceptor (E2I) is a multi-operational mode defense interceptor which retains the classical endo commit/endo intercept operational mode along with the increased operational modes of exo commit/exo intercept and exo commit/endo intercept. The multi-mode capability allows E2I to intercept ICBM RVs before, during and after reentry, as well as short-range and depressed trajectory SLBMs. The battle manager will provide launch cueing, target/cluster centroid state vector, and operational mode selection to the interceptor which is capable of providing and updating its own onboard target selection and homing due to its advanced seeker concept, but can also accept update information from sensors and battle management.

CHARACTERISTICS:

The requirement for HEDI to function in the atmosphere at a high velocity requires emphasis on propulsion and rapid divert capabilities. The vehicle and its individual components also must be able to withstand the high temperatures generated by atmospheric friction.

The battlespace characteristics require E2I to be a lightweight interceptor with particular emphasis on target selection/designation using transatmospheric phenomenology effects, and propulsion and divert capabilities for hit-to-kill. The vehicle and its individual components also must be able to withstand the high temperatures and stringent environments during hypervelocities generated by atmospheric friction.

PROGRAM STATUS:

The KITE program is an ongoing technology demonstration program structure to resolve critical issues associated with high velocity interceptors using existing and developing technologies. In FY90, the first KITE flight test (KITE-1) was successfully completed at White Sands Missile Range (WSMR). All KITE-2 kill vehicle subsystems have been delivered and integration tests are ongoing and on schedule to support an FY91 KITE-2 flight test at WSMR.

The HEDI KITE Program, scheduled to conclude with the KITE-3 scheduled for FY93 at WSMR, will evolve into a series of E2I flights at WSMR and U.S. Army Kwajalein Atoll (USAKA). The procurement process for the E2I Demonstration/Validation is ongoing with an award expected by early FY92.

CONTRACTORS:

HEDI KITE
McDonnell Douglas (Prime) (Los Angeles, CA)
Hughes (Seeker) (El Segundo, CA)
Aerojet (Controls) (Sacramento, CA)

HEDI E2I - To be awarded.

BOEING
U.S. ARMY

AIRBORNE SURVEILLANCE TESTBED (AST)

MISSION:

The Airborne Surveillance Testbed (AST) project, formerly called the Airborne Optical Adjunct (AOA), is an Anti-Ballistic Missile (ABM) Treaty-compliant technology experiment to determine how sophisticated, airborne electro-optical sensors can best provide early warning and tracking of enemy ballistic missile warheads. The system holds the promise of being able to detect a wide range of objects during their flight outside the atmosphere and, as these objects generate heat on reentering the atmosphere, to discriminate warheads from decoys, debris, and chaff which may reenter with them. As such, the AST supports sensor technology for the boost, midcourse and terminal phases of ballistic missile defense. It also provides for functional validation of the performance of airborne platforms for real-time, onboard processing of integrated sensor components.

CHARACTERISTICS:

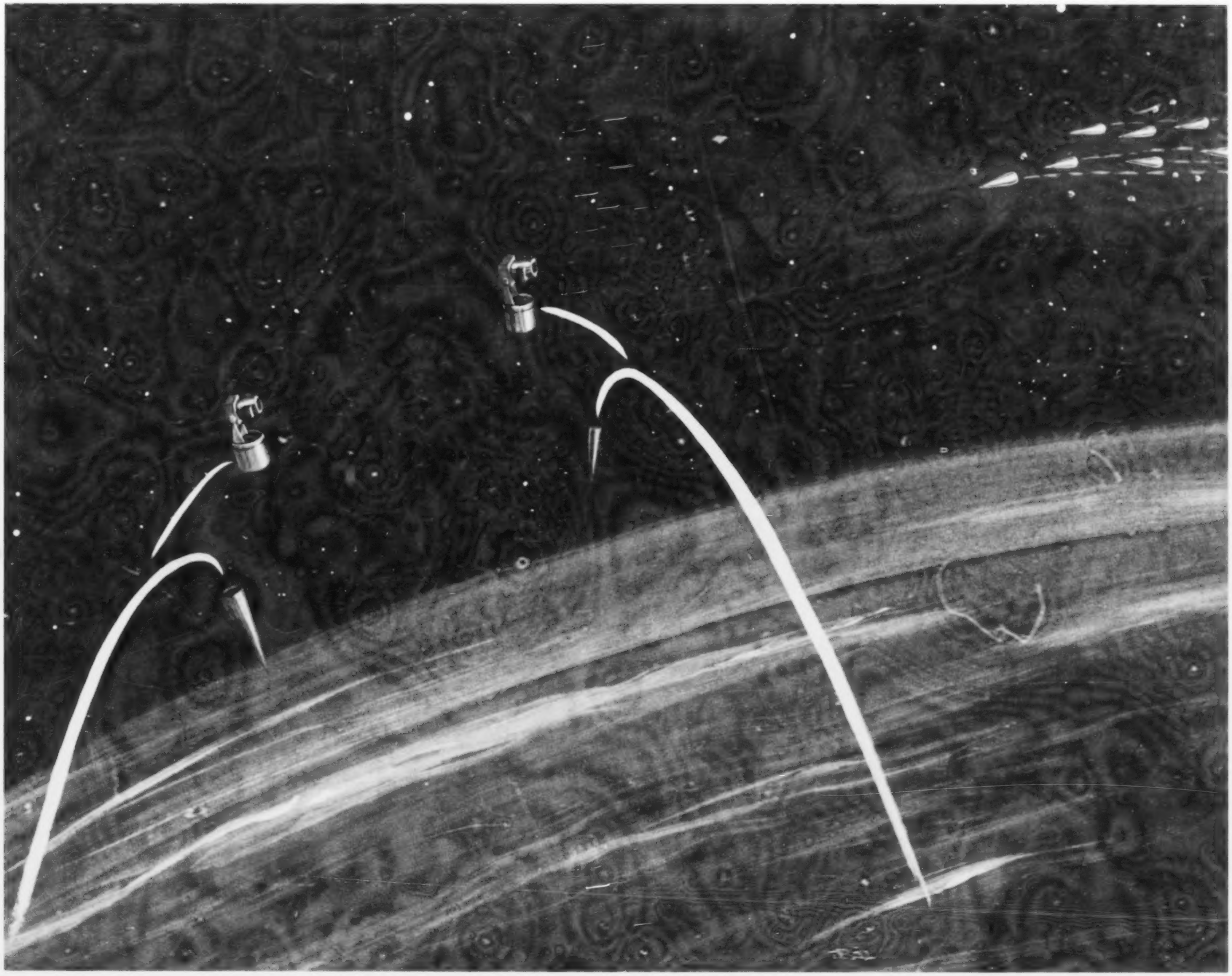
The system consists of a state-of-the-art Long Wave Infrared (LWIR) sensor and data processor installed in a modified Boeing 767 commercial jet aircraft. The key to AST performance is ability of the LWIR sensor system to detect the heat of objects at long ranges against the cold space background within its field of view. The system will be used to test LWIR and data processing performance and as a testbed vehicle for other sensors and SDI systems.

PROGRAM STATUS:

The AST completed CONUS flight testing in the summer of 1990 and flew one mission against a Minuteman III in September 1990 at U.S. Army Kwajalein Atoll (USAKA). Missions will continue as funded and directed.

CONTRACTORS:

Boeing (Prime) (Kent, WA)
Hughes (Sensors) (El Segundo, CA)
Honeywell (Data Processing, Computer Hardware) (Clearwater, FL)



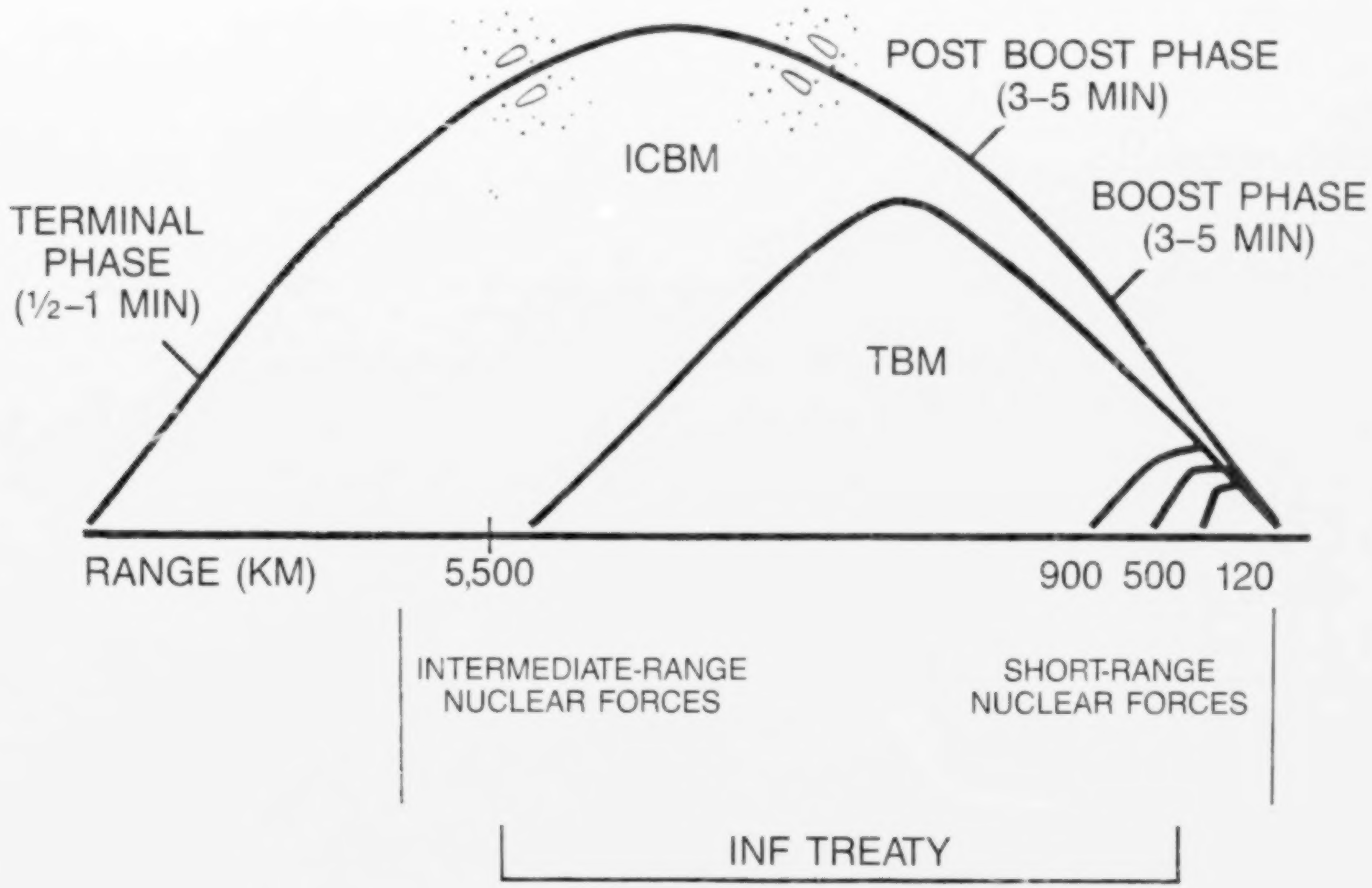
GROUND-BASED SURVEILLANCE AND TRACKING SYSTEM (GSTS)

MISSION:	The Ground-Based Surveillance and Tracking System (GSTS) will support tracking and discrimination in the midcourse phase of the battle space using sensors, launched at an appropriate time after receipt of attack warning from boost-phase sensors, to provide to the distributed battle manager correlated data on reentry vehicles during the midcourse phase. This system will be used to augment performance of space-based sensors, to cover gaps in other sensor coverage created by antisatellite attacks or nuclear detonation, and to provide taskings for the Ground-Based Radar.
CHARACTERISTICS:	GSTS will use a passive Long Wave Infrared (LWIR) sensor to perform discrimination and tracking. This system incorporates devices to provide high speed signal throughput and rapid onboard data processing.
PROGRAM STATUS:	A prototype GSTS is being developed to provide for technical validation experiments and test flights to support midcourse discrimination and tracking. The GSTS will be integrated with sensors for a full end-to-end tracking and discrimination experiments. A validated GSTS system concept will complete demonstration and validation in the mid-1990's.
CONTRACTORS:	McDonnell Douglas (Prime) (Huntington Beach, CA) Hughes (Sensors) (El Segundo, CA) TRW (Software) (Huntsville, AL) Honeywell (Data Processor) (Clearwater, FL) SPARTA (Systems Engineering) (Huntsville, AL)

GROUND-BASED RADAR (GBR)

MISSION:	The Ground-Based Radar (GBR) encompases the development of a family of radars which will support theater missile defense (TMD) and ballistic missile defense (BMD) interceptors. Critical functions to be accomplished include the acquisition, tracking and discrimination of incoming targets.
CHARACTERISTICS:	GBR is a high power, phased-array family of radars. The radars will depend on new software development to control all aspects of the system and to perform the crucial acquisition, tracking and discrimination functions. The various radar missions to be performed will influence the physical size and configuration of each radar. Modularity and commonality of components will be emphasized during radar development.
PROGRAM STATUS:	The program office has recently received guidance from SDIO to pursue the family of radars concept. System Engineering efforts aimed at identifying and defining modular requirements common to both the TMD and BMD versions are ongoing. Testing of the TMD version is envisioned for FY93. A number of significant studies relating to GBR-X use and capabilities have been completed.
CONTRACTORS:	Raytheon (Prime) (Boston, MA) TRW (Software) (Redondo Beach, CA) Control Data (Data Processing) (Redondo Beach, CA)

THE ICBM AND TBM THREAT


POST BOOST PHASE
(3–5 MIN)
ICBM
TERMINAL PHASE
(½–1 MIN)
BOOST PHASE
(3–5 MIN)
TBM
RANGE (KM)
5,500
900
500
120
INTERMEDIATE-RANGE NUCLEAR FORCES
SHORT-RANGE NUCLEAR FORCES
INF TREATY

THEATER MISSILE DEFENSE

MISSION:

The Theater Missile Defense (TMD) Office is developing methods to counter tactical and theater missile deployment in any theater of operations. Of particular concern is the rapid proliferation of tactical missiles in the Third World which are not constrained by any treaty and which must be faced by U.S. Forces deployed in contingency theaters of operations. The TMDO provides the focal point for Army research and development of a "system of systems" incorporating existing and emerging technologies. The TMDO consolidates management in a single agency, coordinates user requirements and focuses technology base and development activities to develop TMD systems for mid-to-late decade fielding. These systems could also provide lower tier support to a Strategic Defense System.

CHARACTERISTICS:

Operational concepts being developed include passive measures to reduce vulnerability of critical assets and forces, active defenses for the engagement of missiles in flight, attack operations (counterforce) for the attack of threat launchers and support structure, and C3I to inject intelligence inputs and control TMD operations. The TMD system must emphasize the use of currently deployed air defense systems as well as the ability for strategic deployability and tactical transportability to contingency theaters.

PROGRAM STATUS:

Current systems and experiments that support TMD include Theater High Altitude Air Defense (THAAD), Extended Range Interceptor Technology (ERINT), Patriot Remote Launch Demonstration (RLD), Advanced Contingency Theater Sensors (ACTS), and ARROW. THAAD provides high altitude, area defense integrated with existing air defense systems. THAAD should award a demonstration validation contract early FY92 leading to a flight test in FY93. ERINT will demonstrate a hit to kill capability against tactical missiles and aircraft and cruise missiles. The ERINT prototype antitactical missile and launch control system will be demonstrated in FY92. RLD validates the concept of expanding the currently deployed Patriot air defense system for asset defense against tactical missiles. RLD uses a remote Patriot radar and communications link to control a fire unit. The demonstration is scheduled for early calendar year1991. The ACTS program will develop sensor(s) which support evolving contingency theater requirements for early warning, attack operations, identification of missiles, and fire control for interceptors. Following one year concept definition studies, a technology demonstration will start in late 1992 to develop active and/or passive sensor(s). ARROW is a cooperative interceptor program between the United States and Israel currently undergoing flight tests.

PRIME CONTRACTORS:

LTV (ERINT) (Dallas, TX)
Raytheon (RLD) (Baltimore, MD)
TBD after CD (ACTS)
Israel Aircraft Industries (ARROW)
TBD after CD (THAAD)